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OBITUARY NOTICES.

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CHARLES DARWIN. By Professor Cossar Ewart.

Charles Robert Darwin, who was the son of Dr. R. W. Darwin, and grandson of the distinguished Dr. Erasmus Darwin, was born at Shrewsbury on February 12, 1809. His mother was a daughter of Josiah Wedgwood. Of his early life little is at present known. For a time he attended the school at Shrewsbury, of which Dr. Butler, afterwards Bishop of Lichfield, was master. It having been decided that he should study medicine, he was at the age of sixteen (1825) sent to the University of Edinburgh. After two sessions at Edinburgh, he gave up the study of medicine, and entered Christ's College, Cambridge, to study for the Church. While in Edinburgh Mr. Darwin seems to have directed his attention chiefly to botany and natural history. During his second session (1826–27) he became a member of the University Plinean Society, and, as the MS. records testify, took part in its discussions, and read before it at least two papers. One of these papers referred to the ova of *Flustra*, the other pointed out *that the small black globular body hitherto mistaken for the Fucus lor was in reality the ovum of the Pontobdella muricata.* These papers probably contained the results of Mr. Darwin's earliest scientific observations. At a subsequent meeting of the Society he presented "specimens of *Pontobdella muricata* ova and young."

After the usual course at Cambridge, Mr. Darwin obtained the B.A. degree in 1831, and in 1837 he was promoted to the degree of M.A. Already an entomologist, on entering Cambridge he soon became acquainted with the distinguished naturalist Professor Henslow. Judging from letters published, Professor Henslow seems more than any other to have been instrumental in leading Mr. Darwin to take a deep interest in natural science; and not only to have ably assisted and advised him in his pursuits, but to have gained his life-long admiration and esteem. Further, we are indebted to Professor Henslow for urging Mr. Darwin (notwithstanding the objections offered that it might unsettle him for the Church) to accompany Captain Fitzroy in the "Beagle,"—a voyage in which we cannot but feel great interest, not only because of the enormous work Mr. Darwin accomplished single-handed, but more especially because it was during this voyage that the great generalisations occurred to him which will ever be associated with his name, and which mark a new epoch in biology, and have had a more profound influence on science than any other doctrines ever published.

Three years after returning from his voyage round the world, Mr. Darwin married, and in 1842 settled at Down, in Kent, where he remained living the quiet life of a country gentleman until his death on the 19th of April last.

Mr. Darwin was elected an Honorary Fellow of the Society in 1865.

Of Mr. Darwin's work, the influence it has already had, and the influence it is likely to have in time to come, it is almost impossible to form any estimate, and still more difficult is it for us to realise his personal character, and the loss we have sustained in his death; for however great he was as a worker, he was still greater as a man. We have only to be reminded of the wonderful manifestations of reverence and regard which followed the announcement of his death, to understand how universal has been his influence, and how keenly his work has been everywhere appreciated. As has been well said, in the "memorial notices," his wholly irreparable loss is "not merely because of his wonderfully genial, simple, and generous nature, his cheerful and animated conversation, and the infinite variety and accuracy of his information, but because the more one knew of him, the more he seemed the incorporated ideal of a man of science;" and that it was not his great reasoning powers, vast knowledge, and tenacious industry "which impressed those who were admitted to his intimacy with involuntary veneration, but a certain intense almost passionate honesty by which all his thoughts and actions were irradiated as by a central fire;"

and again, that his "character was chiefly marked by a certain grand and cheerful simplicity, strangely and beautifully united with a deep and thoughtful wisdom, which, together with his illimitable kindness to others, and complete forgetfulness of himself, made a combination as loveable as it was venerable."

When we consider Mr. Darwin's work, we are led to regard him as one of the most fortunate and successful observers of natural phenomena, and as the greatest generaliser in the whole history of biology; and further, we are impressed with the great influence his generalisations have had on all other sciences.

What, in a few words, may be said to be Mr. Darwin's great work? It is not that he first propounded the theory of *evolution*, nor so much that, taking into consideration heredity, the struggle for existence, and the survival of the fittest, he hit upon the idea of *natural selection*, as that by undertaking elaborate investigations, by collecting facts from every possible source, and by pondering over and testing his conclusions again and again, he was able, after many years of patient industry, to publish an all but complete *proof* of evolution. He has thus not only increased our knowledge, but, by establishing a new principle, has completely revolutionised biology, introduced order where there was confusion, and laid new foundations on which naturalists are raising a fair and comely edifice, which will form the best and most lasting monument of the great philosopher of the nineteenth century.

So familiar are we all with Mr. Darwin's writings, that it is scarcely necessary to do more than mention some of the more important ones. First of all, one naturally thinks of that mine of wealth to the naturalist, the *Origin of Species*, in which we have condensed into an exceedingly small compass facts enough for a dozen volumes; yet notwithstanding the great condensation manifested throughout this book, the reasoning is evident from beginning to end, and the conclusions stand unassailable. It reads as if it were the epitome of a whole series of works which the author had intended to write, and for which material had been collected, rather than as an introduction; an epitome, however, so complete and suggestive in itself that, like a picked army, it was able to fight its way so effectively, that it was found to be practically unnecessary to fall back upon the vast reserves which had been accumulated in order to support by detailed evidence the new doctrines. Hence, after publishing *The Variations of Plants and Animals under Domestication*, Mr. Darwin was again able to turn to Nature, not so much now for evidence of his theory, as by applying the principle of natural selection to point out how hitherto obscure problems might be explained.

In the *Variation of Animals and Plants*, and in the *Expression of the Emotions in Man and Animals*, we have further evidence of Mr. Darwin's enormous power of work, his faculty for collecting and arranging facts, and of the remarkable ability he possessed of drawing from them conclusions which indicated a wonderful insight into the secrets of nature. Further, in all of these works, as also in the *Origin of Species*, we have numerous observations of great importance and interest, which mark out Mr. Darwin at once as an able and careful investigator; but his fitness for pure zoological work is still more evident when we turn to the *Naturalist's Voyage Round the World*, and to the *Monographs on the Cirripedia.* Those familiar with the elaborate memoirs on the *Cirripedia*, must feel that Mr. Darwin was as capable of prosecuting purely morphological work as he was in performing physiological experiments, or of working out philosophical problems, and that although his zoological investigations are thrown into the background by his profound generalisations, they are of themselves of sufficient importance to entitle him to rank with the greatest biologists of any age.

What has been said of Mr. Darwin as a zoologist, may almost with equal propriety be said of him as a botanist and geologist. To quote again from the "memorial notices:"—"It is not too much to say that each of his botanical investigations, taken on its own merits, would alone have made the reputation of any ordinary botanist." Most of his investigations on plants were communicated to the Linnean Society, and then published in a collected form. A volume on *The Effects of Cross and Self-Fertilisation in the Vegetable Kingdom*, was published in 1876, and in the following year appeared the results of his work *On the Different Forms of Flowers on Plants of the same Species;* and in addition to these we have the memoirs *On the Various Contrivances by which Orchids are Fertilised by Insects; The Movements and Habits of Climbing*

Plants; and also the well-known treatise on *Insectivorous Plants.* We perhaps learn best the influence of Mr. Darwin's work on botanical science when we compare the ideas held as to the distribution of plants before and after the publication of the *Origin of Species.* Previously, it was generally believed that the different species and genera were special creations, and that the regions in which the same forms occurred being similar, had led to the creation of similar plants. This theory entirely failed to account for the appearance of similar plants in regions which had nothing in common in their physical conditions, and for their absence from places where the conditions were similar; whereas, as pointed out by Sir Joseph Hooker, by adopting Mr. Darwin's theory, "The theory of the modification of species after migration and isolation, their appearance in distant localities is only a question of time and changed physical conditions."

Mr. Darwin's geological work was chiefly the outcome of his voyage in the "Beagle." The most important of these is the masterly treatise *On the Structure and Distribution of Coral Reefs.* As with zoology and botany, however, his generalisations have had more influence than his special investigations. About the time when advanced geologists were beginning to feel that the old notions about fossils utterly failed to account for the distribution of organisms in the rocks, they were startled with the announcement of the theory of natural selection, and soon deeply impressed with the fact insisted on by Mr. Darwin, that the geological record was still very imperfect. Just as this theory has hurried on by leaps and bounds the study of embryology, so it has given a mighty impulse to palæontology. Having no longer to battle over what is, or what is not, a species, palæontologists are now vieing with embryologists in working out the ancestral history of organisms. The work of Professor Marsh alone amply testifies as to the success of these investigations. Not the least important of Mr. Darwin's works, from a geological point of view, is his treatise on *Vegetable Mould and Earthworms.* A paper "On the Formation of Mould" was read at the Geological Society in 1840. After more than forty years, during which period he made numerous additional observations and experiments, his book on *Earthworms* made its appearance—this, with the exception of two papers, read before the Linnean Society shortly before his death, being his last work.

We might now indicate what influence Mr. Darwin has had on mental and other sciences: how that, through his general nobility of character, and his moral attributes rising pre-eminently above his intellect, he has been able to effect the greatest revolution of modern times without creating more than a passing show of strife and bitterness: and how all his work was accomplished under physical difficulties which an ordinary man would have considered excuse enough to regard himself as a confirmed and helpless invalid; but feeling intensely how difficult it is to express in words what one feels regarding Mr. Darwin, we shall refrain from saying more. Those who knew the chaotic condition to which Biology had been reduced before the appearance of the *Origin of Species* in the memorable year of 1859, and who have had the opportunity of observing order take the place of confusion, and light that of darkness, can best testify to the mighty influence of Mr. Darwin and to the loss the cause of science has sustained in his death. As we lament our loss, let us however remember that, in one sense, the hero so many of us worshipped is still with us, and that he lived to see his great life-work completed and justly appreciated in all parts of the civilised world.

J. COSSAR EWART.

EMILE PLANTAMOUR. By the Astronomer Royal for Scotland.

On September 7th of the present year, at the age of 67, died our Foreign Associate, Emile Plantamour, director of the Observatory of Geneva, and professor of both astronomy and physical geography in the university of the same city.

Victim at last to a sudden accession of consumptive disease, he died in full possession of his admirable mental faculties, and as universally regretted as he had lived generally respected, not only in his own, but in every other country where science is known and civilisation appreciated; for well had he exhibited throughout his whole career how much of kindly goodness, as well as intellectual ability, does so often characterise those who are snatched out of this world immaturely by that insatiable malady of the lungs.

Born on the 14th of May 1815 in Geneva—a year after his little father-state had escaped from its temporary subjection to the first Bonapartist empire of France, and had joined the Helvetic Confederacy—Emile Plantamour's commencing epoch was that of young Switzerland, and he ultimately became as excellent a representative as could be found anywhere of that peculiar yet admirable microcosm of a republic, whose strict observance of law and order the red agitators of Paris can by no means understand; and even the United States of North America, republicans and democrats alike, do not altogether comprehend how it can continue to exist so anomalously to them—"a republic without a president!" And yet it not only exists, but lasts and grows, produces wealthy families too, capable, as with the Plantamours, of educating themselves up to the highest pitch of usefulness to their State, without seeking any help from others beyond the use of the self-supporting institutions in that case already made and provided.

But just as the school, or "the old college," wherein the young Plantamour spent the earliest of his hard-working years of learning as a boy, was of that staid and solid character that might be expected in an institution founded by Calvin, soon after the Reformation, so the comfortable private means of the older Plantamour's, like that of so many other Genevan families, had been attained in a manner worthily corresponding thereto. For not by manufactures nor by commerce, still less by speculations or bubble companies, were those tidy little Alpine accumulations obtained, but by the magnificent moral control of the progenitors of the family and their successors, one and all determining to live, though put to any straits for a time, on half only of their yearly income, leaving the other half to grow at compound interest.

Emile Plantamour himself was still too young to think much of these things while at Calvin's school; but by the time he had passed through that institution, also through the higher academy of Hofroyl, and then the classes of the Genevan University, he was called on to choose his future walk in life as a working member of the busy republican mountain hive. So he elected to be an astronomer—a Helvetian astronomer of course. But what is there peculiar in that prefix? This mainly, that while the Helvetian confederation forms so small a patch of country, surrounded by great empires, it yet possesses more diversity of populations than any of them; so that but for the mysterious cord of Helvetic unity, its French cantons would be ever fighting against the German, and the Italian against both. Wherefore, all the great and good citizens of that up and down mountainous land seem ever to have a most difficult problem of their own to work at, viz., how to keep up the vigour and elasticity, the frictional polish and emulating fervour of those several competing nationalities, while inducing them, nevertheless, to do all peacefully, and voluntarily to contribute each their best characteristics, so as to raise the united name of a Swiss republican for virtue and education, valour, prudence, and understanding, above that of all collections of men, if possible, ruled in any other manner. Wherefore, thus did M. Plantamour proceed on attaining to virile growth and privileges.

From the university of his native city he went to Paris, and studied for two years under Arago, that grand specimen of the Celtic Gaul; a man of superb genius, of commanding presence, of daring flights into the connection and bearings of hitherto untrod branches of physical science; and with whom occasional researches into the curiosities of magnetism, or the uncultivated jungles of meteorology, combined with public displays of fervid eloquence—took the place of regular observatory work, and was thought everything of, almost up to adoration, in the midst of a Latino-Celtic population.

After highly approving himself and his mountain-born abilities among that class of men, descendants of warriors and native chiefs of long, long ago,—Emile Plantamour went north to Konigsberg, and there, under the grandest soul in all Germany for philosophical breadth, instrumental skill, and mathematical power in gravitational astronomy—though originally only a grocer's apprentice, the illustrious Bessel—he learned by what kind of steady work and calm devotion in a quiet home the Teutonic mind obtains some of its highest triumphs. While thus truly a student studying under Bessel, young Plantamour produced, as a thesis, a most creditable essay "On the Determination of the Orbit of a Comet according to Olbers' Method from three Observations." Next he went into Berlin, where, under the celebrated Encke, he learned the still more rigid work of meridian astronomy, besides enjoying the improving society of the great traveller Humboldt, the magnetical mathematician Gauss, and the astronomical analyst Hansen.

Returning to Geneva in 1839, the venerable Alfred Gautier retired, and Plantamour, able now to look on astronomy from every side, or as a Switzer of each and every diversely tongued canton, was installed as director of the observatory, with powers to choose and direct accordingly. Wherefore thus he proceeded. Not with any of the two or three great observatories of the three or four gigantic countries, powerful governments, and populous nations around him, would he contend in their ancient and still prescriptive work of procuring new expressions for the oldest fundamentals of the grand classic astronomy of sun, moon, and principal planets; no fresh and always minutely differing values would he attempt for the exact quantities of precession and nutation, for the aberration of light, for refraction, and sun-distance; on each of which inquiries such myriads of pounds sterling have been, and still are, being spent, and libraries of books written in the great centres of civilisation; but, while fully appreciating both the grandeur and difficulty of those problems as much as any of the savants working at them, he chose more especially "the orbits of Comets" as the future distinctive subject of his observatory labours.

Comets, however, will not always come just when they are wanted; and so, for a time, we find the disciple of the German Bessel, remembering anew the Gallic Arago, and to such purpose, that the very earliest of his published memoirs in his new directorship, was on "Atmospheric Electricity." Then came two years observations of terrestrial magnetism. And next, duly considering the wants of those of his countrymen engaged in the staple industry of Geneva, watch-making, he organised a department in the observatory where watches and chronometers sent in by the local makers are submitted to a variety of scientific tests, the results published, and prizes awarded for the best time-keepers; with the happiest effects too in promoting improvements in that most delicate branch of all the mechanical arts.

But in 1843, Plantamour's own faithful waiting was at length rewarded by the apparition of one of the most splendid, and in every way remarkable, comets of modern times. Seen first in broad daylight close to the sun, and afterwards hurrying away into the depths of space with a longer train than any known comet since Newton's day, this chief of comets, in 1843, opened a new epoch of activity among all the observatories; while Plantamour was the first of the computers to announce that in its perihelian passage this comet must have almost grazed the very surface of the sun. That it must have seen for two hours the sun's incandescent disc under an angle of practically 180°, and have been exposed for that length of time to a radiation sufficient to vapourise iron, platinum, and every known metal; yet had it lived, preserved its movement, and gone off at last apparently uninfluenced on its regular orbit. And what kind of orbit was that?

Ah! That indeed is the question; never more abundantly discussed too than at this moment in connection with a comet of the present year. Plantamour had been strong enough in his first theoretical university essay on the beauty of determining a comet's orbit from three observations; but he soon learned in practice that no three observations ever taken by man, much less the first three that are usually secured of such a sudden and unexpected intruder as the great comet of 1843, can give more than a very wide approximation to that one of all the orbital elements which the public most cares for, viz., its period; and thence the date when it will next be seen, as well as that when it was last visible. He showed indeed without controversy, that it was a closed orbit, and of no very great duration; but whether of 165 years, or 22, or even less—and why, in that case it had not been seen oftener, subsequent to its supposed record in 1868, he left for the future to determine.

And now comets followed one another quickly; the next with which Plantamour occupied himself being the second of 1844, called the Comet of Mauvais; and a most opposite one it was to that of 1843 in almost every particular. For this of 1844, though little more at any time than barely visible to the naked eye, remained within telescopic range for nearly nine months; was well and numerously observed during the whole of the time, and gave to M. Plantamour's calculations, perfected as they were in this instance by his careful introduction of corrections for planetary perturbations, a perihelion distance of so much as 78 millions of miles; and a period, reaching the hitherto unheard of extent, of 102,000 years, subject to an uncertainty of not more than $\frac{1}{30}$th of the whole.

Again in 1846 came the separation of Biela's comet into two. These were long followed up by Plantamour, both by observation and calculation; until he at length proved them to be each proceeding on its own independent course through space, quite uninfluenced by the other. It was but a small telescopic comet at any time, until that startling telegraphic announcement of Herr Klinkerfues to Mr. Pogson at the Madras Observatory, on December 2 (1872), thus concentrating the results of his long and difficult orbital calculations :—"Biela touched earth on November 27, search near θ centauri." Pogson accordingly turned his telescope in that southern direction, and found a retreating, and already far-off patch of cometary matter in that quarter. But what had the inhabitants of the northern side of the earth witnessed on the 27th of November? A brilliant display of shooting stars so-called, or isolated meteoric stones, darting through the upper rarefied air at the rate of more than 1000 miles a minute, and taking the regular meteoric observers quite by surprise, as being an altogether abnormal and unexpected vision to them.

Here, accordingly, was admirable authority for Plantamour adding to the Besselian astronomy of cometary orbits, the physical studies of the Aragonian school. But his observatory was ill supplied with instruments of size and quality adapted to such researches, and neither the University of Geneva, nor the politicians thereof, were inclined to spend anything to improve them. So, by noble self-denial, and out of the economies of his ancestors, Plantamour supplied a fine equatorial, with objective of 10 inches aperture, with tower and revolving dome, to the establishment; and kept it thenceforward at excellent work for the credit of the community and the promotion of astronomy.

The situation, too, was deserving of being so powerfully instrumentalised. No less than 10 degrees of latitude further south than Edinburgh, raised on a plateau 1200 feet above the sea-level, in a drier and generally warmer air, and with far less of dreadful coal smoke belching around from blackened and blackening chimneys; a telescope could there be used to its full advantage; and the climate itself would afford, especially in the land, and to a countryman, of Saussure, a most deeply interesting study.

From his very first appointment to the observatory, Plantamour had continued in the *Bibliotheque Universelle Journal*, the publication of the comparative meteorological observations begun to be taken long before, both at Geneva and at the Hospice on Mount St. Bernard ; the earliest example it is said of a systematic study of the climate of elevated regions ; and the results, discussed as they were by the hand of a master, were eventually published in his work entitled *The Climate of Geneva from* 50 *years of Observation.* To these again he added his brilliant studies of the physical geography of the region, chiefly from the astronomical and accurate point of view ; conducting extensive levellings, both instrumental and barometric, over the highest ridges, and through the deepest valleys of Europe; determining also the force of gravity by pendulum observations in numerous localities, and their longitudes both by telegraphic signals and geodesic measures of the most exact kind.

In short, this admirable man, as our own learned and most devoted librarian, Mr. James Gordon—to whom I owe much of these materials, has kindly informed me—produced in his time no less than 83 distinct memoirs, varying in size from pamphlet to book, with a distribution of their subjects, something as follows,—

Cometary, observations and calculations . .	27
Astronomy, general	6
Eclipses, Solar transits, new planets or planetoids	8
Magnetic	2
Atmospheric Electricity	1
Meteorologic	28
Hypsometric and Geodesic	11

besides several other memoirs in conjunction with M. Hirsch and M. Birner, chiefly geodetic.

No wonder then that his local biographers have described, that even in his later years, when though over-shadowed by the threatenings of his eventually fatal disease, he yet worked a full eight hours a day ; and at a kind of astronomical labour which does not exactly repose the mind. Yet through it all, they record that he was ever the gentleman, the man useful to the community, and always ready to give his services wherever they were asked. Oh ! what abnegation of self, for who amongst us, living happily under an ancient, long consolidated, and much loved constitutional monarchy, can presume to know the many republican calls that were made on Citizen Plantamour's time and attention.

"All the scions of our richer families," said a fine old specimen of a New York State country gentleman to me not long ago, "find it expedient to enter into politics, in order to understand the mind of the people, and endeavour to lead public opinion." So too did Plantamour, and with success. For he was listened to with deference whenever he spoke, even in the most radical assemblies. And if not personally present, the mere statement by any orator there that "Plantamour thinks so," would often suffice to carry the day.

And in Emile Plantamour there was something more and beyond mere political wisdom to admire. For when I had, on one occasion, the honour of receiving a letter from him; and which, beginning with a discussion of the Meteorology of the xiiith vol. of the *Edinburgh Astronomical Observations*, went on to speak of various little local institutions he was interested in, as his Bible Society, his Scripture reading Society among the poor, and other similar institutions, a lady listening to my reading started to her feet and demanded "What French savant was capable of such ideas."

So then I had to explain, that although the letter might be written in the French language, the man himself was a Switzer; born in Geneva; and educated in a school founded by Calvin, and approved of by John Knox. Whence immediately she understood the possibility, or even recognised the origin, of that wide philanthrophy joined to the highest science. And this meeting will doubtless similarly appreciate how much our Society has lost in every way by Emile Plantamour's recent demise; so very soon too, or within 18 months, after the Council had selected his name to occupy that honoured place amongst our Foreign Associates which the Royal Society of Edinburgh has always desired to see filled by some representative of that noble, though circumscribed, community dwelling amongst the higher Alps.

C. P. S.

CHARLES DAVIDSON BELL. By the Astronomer-Royal for Scotland.

Late and for long the Surveyor-General of our vast colony of the Cape of Good Hope, elected an Ordinary Fellow of this Society on March 4, 1878. Died here on the 7th of April 1882, aged 69.

Born at Newhall, in the parish of Crail, in the East Neuk of Fife, in 1813, in a family of three, and of so long lived a race that his mother lived to 85, his father attained to 90, his father's elder brother, General Sir John Bell, a leading officer of the Staff Corps in the Peninsular War, and highly approved of by the Duke of Wellington, reached the still nobler age of 95, and a grand-aunt lived to be 101, while his own brother and sister are still living, hale and hearty ;—it might therefore have been hoped, that when Charles D. Bell retired from southern official life to this country, in 1874, there were yet many years before him, wherein to exercise at leisure the many fine talents wherewith he was gifted, and in a manner to show forth something of the fervid love and even ecstatic devotion he always bore to his native land, notwithstanding his long separation from it.

But that was not to be. The trials and the stresses he had gone through in the South African climate and country were too many and too severe, however successfully they seemed to be overcome at the time. Success, indeed, usually crowned almost everything he undertook ; and he would have had a far more notable name among us had his career been confined to Old Scotland, instead of being spent so entirely as it was from his sixteenth to his sixty-first year in that new and greater Scotland which stretches now all across the globe, from Canada in the north-west to Australia and New Zealand in the south-east, with the Cape as a very central stronghold. Originally, no doubt, the Cape was a Dutch colony, but one wherein it was long ago remarked to me, that among the many British residents that had come flocking in, every one who got on best, whether in the higher or lower walks of life, was always a Scotchman. And one of the most noteworthy of those, because mainly by such original efforts and innate qualities of his own, was the subject of this notice.

Though leaving his country at so early an age (in 1829), Charles

D. Bell's preparations and prospects were good; for he had attended classes at St. Andrews University, in fellow-studentship with John Goodsir (afterwards Professor of Anatomy in Edinburgh) and his brother Joseph, the minister. While at the Cape, his uncle, then Colonel Bell, private secretary to the Governor, and afterwards and for many years the sage and steady Colonial Secretary, was greatly interested in him.

After a period of service in the Secretary's office, C. D. Bell was transferred to that of the Master of the Supreme Court, and then to the Audit Office of the Colonial Government, becoming a favourite everywhere; until it seemed as if his friends intended the young man for a future of nothing but quiet, resident, jog-trot official life in Cape Town itself, and no further. But in 1833, Sir (then plain Dr.) Andrew Smith (of the Army Medical Service) succeeded in organising an exploring expedition for penetrating into the interior of South Africa on a grander scale than anything hitherto attempted. Whereupon the internal fires of C. D. Bell's own spirit broke forth; and, against the advice and even strenuous opposition of his legal guardians (for he was still under age), he would give up all his other prospects in order to seize this opportunity of penetrating into the great unknown. And though he *was* allowed to join the party at the last moment, it was only on condition of taking the lowest place in it.

An old friend, who well remembered meeting him just after he received his leave, has some years since described in print the wild enthusiasm with which C. D. Bell galloped through the streets of Cape Town to dash off preparations for the immediate start. He was a handsome-looking young fellow too; not very tall, but broad-built and muscular, with a rather brown complexion, but regular features of refined and sculpturesque character, piercing black eyes, and dark lank hair.

The expedition, in spite of its numbers, was generally looked on as one of imminent danger. The latest previous expedition had been cut off to a man; and no previous parties had ever returned without having undergone more or less perils of thirst, of hunger, of wild beasts, of lurking Bushmen with poisoned arrows, and whole tribes of more openly slaughtering foes. But away went this new expedition, striking straight across those stony tablelands of blinding sunshine, roasting heat, and terrestrial drought, which fence in the Cape Colony along its northern and north-western frontiers almost as imperviously to all ordinary travellers as though they were walls of iron rising up to skies of brass, and intended to prevent inquirers from entering into the mysterious interior beyond, stretching away, as it was then supposed, uninterruptedly to the Equator itself.

A Kaffir war breaking out soon afterwards on the north-east frontier of the colony, the expedition was lost for a time to sight and hearing; but after three years it returned safe, successfully too, on the whole, and with C. D. Bell raised by shere merit and proved capacity to be its second in command. But he had done far more than merely rule over others, and order their services; for when the Association which had defrayed the expenses of the expedition held a public meeting in 1836 to exhibit its results (a meeting at which Sir John Herschel, then in the colony on astronomical research, presided, and gave a splendid address), every one was astonished, delighted, and instructed at finding the walls of the room decorated by nearly three hundred of C. D. Bell's drawings. He had been the artist of the expedition, and such an artist as showed him to possess a soul of true genius, if there be any one in the world of whom that can be properly said.

There, in those matchless drawings, was the peculiar country the expedition had passed through, in its minuter as well as larger features; unadulterated, moreover, artistically by any methods of drawing taught at home on English trees and hedges and shady lanes; for C. D. Bell had taught himself in South Africa on exactly what nature presented to him there. Hence was the great interior's physical geography, geology, and vegetation, too, where there was any, depicted again and again, either in brilliant colour, or *chiaro-scuro* force of black and white, and almost perfect truth of outline; with the very atmosphere also before one to look into, as it shimmered and boiled in the vividness of solar light, and over stony surfaces heated up to 140° or 150° Fahr.; but yet garnished with episodes of the wild animals of the region—generally gigantic mammals, of South Africa to-day, but of other parts of the earth only in some past geological age; and with lifelike examples of the natives of every tribe whose lands the expedition had traversed, depicted in their most characteristic avocations. From little Bushmen securing once in a way a mountain of meat, in a desert without water, by taking a two-horned rhinoceros in a pit-fall, to the Zulu regiments of King Moselikatse going forth with cow-hide shield and stabbing assegai to exterminate some neighbouring tribe; or the poor of his kingdom, with famine girdles braced tightly round their loins, following in the track of lions, in hopes of partaking of some of their leavings: they were all on those faithful sheets of paper. While, so keen was C. D. Bell's appreciation of the ridiculous, that if there was any young fop among the nearly naked Bechuana or Malokolo, who wore his dress of a few jackals' tails and *some* glass beads with a particular twist of his own invention, and thought he looked so handsome in it that all the women must be falling in love with him, this native-born dandy was sure to figure in some one or other of Mr. Bell's drawings; for he drew as much, or more, from memory in the silent watches of the night, as by sketching direct from nature through the day.

That that brilliant collection of pieces of graphical information never saw the light again until, after twenty years, a few of them straggled out to illustrate later travellers' books,—was no fault of Mr. Bell's. For he had necessarily to give them up to his chief; and he, a very learned naturalist, and taken up far more with curiosities in the way of undescribed snakes,—was allowed by the Association to carry out a scheme of his own for obtaining renewed funds for more expeditions, by exhibiting all his natural history treasures in that focus of wealth and Government patronage, London; but with a result which totally failed to pay its own expenses.

Meanwhile Mr. Bell quietly re-entered the Audit Office of the Colonial Government, where he was raised from his former junior position to be chief clerk; and not long after that received the acting clerkship to the Legislative Council, holding that honourable position during a two years' absence of the proper officer.

But mere pen-work within four walls was not enough to satisfy C. D. Bell's aspirations, or assure his conscience that he was thereby turning to the utmost account all the varied talents committed to him by his Creator. In 1838, therefore, he began to turn his attention to surveying, and became soon after, one of the sworn land surveyors of the colony;—a colony twice the size of Great Britain, but with a population of half the city of Edinburgh. A colony of immense, craggy, rocky, mountain ranges (Le Vaillant termed one of them "the backbone of the earth"), and extensive desert plains, with a nice variation in the quality of their barrenness accordingly as they were of deep sand or ferruginous clay, mixed or unmixed with salt and gypsum. A colony, too, where the British element of population was still in utmost minority; and where the surveying system hitherto in vogue in the back, or over-berg, country had been—to let any Dutch boer, wanting land, choose some possible central water-hole in Government or unoccupied ground, and then ride round it on horseback for three hours, or drive round it on an ox-waggon for three days, according to its degree of want of vegetation; such interested boer undertaking to remember against all future comers what particular isolated bushes, or great rocks in the weary land, he had seen during such circumferential ride or drive, and had then and there chosen to be his baakens, or landmarks for ever afterwards.

As population increased, such a system was of course most fruitful in land disputes, and the then Surveyor-General, Colonel Mitchell, formerly of the Portuguese Legion in the Peninsular War, found his attempts to introduce accurate surveying into town lots grievously swamped by having presently the legal business of certain Landdrosts, Heem-raden, and up-country Dutch Civil Commissioners, further thrust upon him, and his then sole assistant, Mr. Hertzog. He applied, therefore, in 1840, and obtained Mr. Bell's appointment as Second Assistant Surveyor-General; when he (C. D. Bell) was immediately sent off on a long and solitary travel, occupying several months (quite a geographical exploration in itself, in his little ox-cart, and attended only by a Malay driver and a Hottentot leader of the oxen), to the north-western corner of the colony, to settle disputed claims there; some of them on the cool Khamiesberg granite mountains 5000 and 6000 feet high, others in the hot and arid plains below, or the sandstone ranges and steppe formations further eastward and northward, even as far as to the Orange River below its falls. And he settled them so satisfactorily, and with so much calmness and wisdom, that the Dutch boers ever after that always addressed him, though still only twenty-seven years of age, by their title of highest honour, viz., "Old Mynheer Bell."

He was next appointed to organise a survey office in the eastern district of the colony, where so many Scotch settlers were established under Pringle and others many years before, in what the Dutch had stigmatised as the "Zuureveld," or field where the grass was sour, and in their eyes, and to their means and resources, good for nothing, except to stick Englishmen in, to serve as buffer between them and the Kaffirs. From thence he was taken for a time by the new Governor of the colony, Sir Peregrine Maitland, to inspect the Kaffir frontier and interior districts. And again, in 1845, across the upper Orange River to Zwartkopjies, "where," says a local print, "the information he had acquired in the expedition of 1833 was found extremely useful." No doubt it was, too, and yet not sufficiently utilised by the Government at home; for had it been, several calamitous disasters of recent years, and excitations of international hatred in the north-east of that country, would have been avoided. The distribution, too, of the British settlers would have been arranged in a manner to profit far more by the physical geography of South Africa; which offers a Brazilian climate on one side against an Arabia Deserta on the other, if you only go far enough in either direction from the intermediate point of Table Mountain and Table Bay, where the Dutch first landed, and for so long looked upon it as their only and commanding centre for their agriculture, commerce, and government in all the southern hemisphere.

In 1848 Mr. Bell became, on the demise of Colonel Mitchell (a demise much lamented, and hastened in no small degree by the extra anxieties of his office), full Surveyor-General of the Cape of Good Hope. Thenceforward, for twenty-six years, he ruled in that department with a suavity, firmness, and knowledge that obtained the best possible results for Government, out of an otherwise almost hopeless, tangled collection of conflicting interests, old legislations, and changed ideas. His thorough knowledge of the colony in which he had grown up to man's estate, his mature development of a judicial breadth of view, combined with his scientific skill and mechanical abilities, were evidently becoming more and more appreciated; for, spite of the over-work of his own office, he was so frequently requested to join divers Government committees, and prepare special reports, such as that on the establishment for convicts, lepers, and lunatics on Robben Island, the newly-found copper fields of Little Namaqua land: and various lines of road to open up hitherto untrodden districts: until at last, such extra demands of the upper colonial officials culminated in this,—that whereas they had quarrelled with and dismissed their recently imported English engineer-in-chief for a proposed line of Metropolitan Railway, extending from Cape Town to the Berg River Valley, and some one must be found to take his place, they unanimously agreed that C. D. Bell was that man; because he was the only one amongst them who could lay out railway curves, build bridges, raise embankments, bore tunnels, inspect locomotives, and, in a word, save them, the great officials of the new "responsible Government," so called, in the eyes of the people, and before public opinion.

And he did help them through that great difficulty by extraordinary exertions of his own, and which he could hardly have accomplished at his then advanced age, but that he had never spared himself. He had lived a triple life all along; first, his official life, whose duties were always paramount with him; second, his private social life, where he was always a favourite; and lastly, his artistic life, which occupied almost every other moment of his existence.

In 1846, while still in Cape Town, by shere dint of his knowledge of the eastern country and people, he produced a long series of drawings in black and white, representing events in the Kaffir war then raging under Sir Peregrine Maitland,—drawings which astonished and delighted the soldiers who had been engaged in the operations,—and, being sent home, were taken on one occasion by the Duke of Wellington into his private study, to con over alone, before giving his opinion on the conduct of that war to the House of Lords.

In 1847, having come home on a short leave of absence, Mr. Bell procured from Messrs. Schenck & Co. of this city, a lithographic press and stones, learned to work it himself, threw off at once a number of South African subjects, varying from the Rev. Mr. Moffat preaching to Bechuanas, down to Amakosa Kaffirs torturing a wounded prisoner; and took the whole plant out with him to Cape Town, a novel and important accession at that time to its means of graphic multiplication.

There he further worked at oil painting; and when the community at last began to awake to the importance of art culture, and opened an exhibition of pictures, he carried off their gold medal for a spirited historical painting, representing Van Riebeck founding the Cape Colony in 1650.

Wood carving next came in for attention during some of C. D. Bell's spare hours; also modelling in clay; such models, after baking in an oven, being then painted in natural colours. For the object of most of these artistic works "in the round" was to preserve the physiognomy, manners, customs, tastes, and traditions of the native races of South Africa. He had enjoyed the opportunity of seeing those races on his first arrival in their country, still numerous, distinctive, and true in their stationary savagedom to a long past antiquity; but before he left, they were rapidly losing, under new conditions, those characteristic features, as well as their ancient, imperfect mother tongues.

Such then was the man, Charles D. Bell, who, leaving most of those precious works behind him, or having given them away right and left too generously as soon as completed, returned to this country in 1874, with his second wife (a Cape lady), two sons, and a daughter. Giving vent immediately to his long pent-up passionate admiration for his native land, he soon joined the Antiquaries and the Meteorological Societies, as well as our own; wrote on the ancient harps of Scotland, and began to illustrate in painting some of the touching ballads of the country's former days. But his existence was saddened by the quickly following deaths of mother, father, and uncle. Then he suddenly lost the use of one eye. Without external change, or internal feel, the sight power was gone. He had always been very short of sight, however keen; and it was that eye, whose surrounding muscular contractions had enabled him to keep a strong concave lens always in place through fifty years of excellent work, which had now suddenly broken down.

But most of all was he affected by the sudden and totally unexpected demise at Crail, during a summer residence there last year, in his father's old house, of his beloved Wife. His faithful spirit never recovered that blow, and he but lingered on for some six months further, until he followed her himself.

I cannot expect that, with my imperfect knowledge of his most multifarious life, I have in any way succeeded in representing it as it so fully deserves to be represented, in all its noble character and just proportions. Nor is there, perhaps, the most pressing of all necessities that I should do so before the present audience; for it is not we, but the Cape people who should erect a statue to him: to him, Charles D. Bell, who did, and accomplished, and suffered so much for them and amongst them, through all the best years of his long period of a most hard-working life and publicly useful career. C. P. S.

William Robertson, M.D. By George Seton, Esq., Advocate.

Dr. William Robertson was born in Edinburgh on the 8th of January 1818. He was the eldest son of Mr. George Robertson, Keeper of the Records in H.M. General Register House, by Eliza Brown, his wife, sister to General Sir George Brown, of Crimean fame, and Mr. Peter Brown, well known as an agriculturist and land valuator in the north of Scotland. He obtained his early education at the Edinburgh Academy, from which he passed to the University; and, after completing the medical curriculum, he continued his studies at Paris, Berlin, and Vienna. In 1839 he graduated M.D. of Edinburgh, his Thesis being on Enlargement of the Heart, which proved to be the disease from which he suffered prior to his death. Four years afterwards he was admitted a Fellow of the Royal College of Physicians. He acted for some time as a physician in the Royal Infirmary, the Fever and Cholera Hospitals, and the New Town Dispensary; and, holding the appointment of Inspector-Physician of the British Civil Hospital at Renkioi, in virtue of the recommendation of Sir Robert Christison, he served as a physician during the Crimean war. He was at one time editor of the *Edinburgh Monthly Journal of Medical Science*, to which he contributed several papers. On the resignation of Dr. Stark, in 1874, he was appointed to the post of Superintendent of the Statistical Department in the General Registry Office of Births, Deaths, and Marriages, having previously acted as Medical Registrar for Scotland. One of his latest official works was the preparation of the Report prefixed to the first volume relative to the Scottish Census of 1881. In 1876, on the death of Dr. Warburton Begbie, he became medical officer to the Scottish Widows' Fund, having by that time gained large experience in matters connected with Life

Insurance, in the capacity of medical referee to the Guardian and Scottish Equitable Societies.

Distinguished by his diagnostic skill and his thorough knowledge of therapeutics, but for his modest and retiring disposition Dr. Robertson might, in the opinion of competent judges, have taken a very distinguished place as a consulting physician; and, owing to his high reputation as a mathematician and a statist, he was eminently fitted for the two appointments which he held at the time of his death. His capacity for figures was of a very high order. He did not hesitate, however, to facilitate his elaborate calculations by the use of the arithmometer, which he was able to turn to the best account, owing to his remarkable memory and his powers of numerical combination.

Nor were his acquirements confined to physical and mathematical science. While well versed in classical as well as modern literature, he was an excellent linguist, being familiar with French, German, Italian, and Turkish, and possessing a fair acquaintance with Spanish and Dutch.

In social life he was a universal favourite, in consequence of his kindly and genial disposition, his fund of anecdote, and his well-stored mind. One of the original members of the Edinburgh Evening Club, he seldom failed to appear at its bi-weekly meetings, where the blank which his lamented death has caused will not easily be supplied. His cordial sympathy with the young was an interesting feature in his character. He was a devoted member of the Church of Scotland, and his political tendencies were Conservative.

In connection with his official appointment in the Registrar-General's Department, it may be mentioned that the office of Joint Deputy Keepers of the Records was held, in the first instance, by Dr. Robertson's grandfather and granduncle, in succession to whom it was held, also jointly, by his father and uncle, and singly, at a later period, by his brother George Brown Robertson, Writer to the Signet, who died in 1873. Accordingly, the official connection of the family with the General Register House extended over a period of upwards of a hundred years.

Dr. Robertson became a Fellow of the Royal Society in 1860. His death occurred at his residence in Albany Street on the 25th of

August 1882, at the comparatively early age of sixty-four. He had been in failing health for about two years, but it was only a week before he died that he became seriously ill. His funeral took place in Warriston Cemetery on the 29th of August, and was attended by a large concourse of attached relatives and friends.

Dr. Robertson is survived by two sisters, with one of whom he resided, while the other is the wife of Mr. John Gillespie, Writer to the Signet, and Secretary to the Royal Company of Archers. His youngest brother, Alexander, a promising artillery officer, was one of the many victims of the Indian Mutiny of 1857.

Since the above was prepared, the writer has received a letter from one of Dr. Robertson's medical compeers (Dr. George Bell) in reply to an application on the subject of his chess-playing, in which he says:—"Dr. Robertson was no ordinary chess-player; he *understood* the game, and practised it with judgment and skill. I know this, for the 'chequered field' was our favourite meeting-place during many years. Always pleasant there as elsewhere, Edinburgh does not know what a rare son she has lost. Though undemonstrative, the Royal Society had few such members as William Robertson."

SIR DANIEL MACNEE. By the Rev. Walter C. Smith, D.D.

Daniel Macnee's life, like that of most hard workers, was not a very eventful one. Its chief incidents were its productions, and these were nowise startling, but rather such as might have been looked for—fruits of patient labour, and proofs of quiet growth. Born at Fintry in 1806, he lost his father while yet a mere child; but he was happy in having a mother who could understand and guide his youth. Very likely that youth puzzled her a little at first, for she would fain have trained him for merchandise and money-making, and his gifts did not lie at all in that line. The sleepy valley of the Endrick, among the green Campsie hills, had to produce its genius like other Scottish glens; and probably his mother had her anxiety, as well as her pride, when it began to dawn upon her that she had given birth to one of that wayward race. I suppose he did his school tasks fairly well for her sake; but after school hours, if he was not fishing the water, he was sketching his companions, or telling the drollest stories of things he had seen or heard, which were truly pictures of the vividest kind. So she concluded that he was born to be an artist; and that, no doubt, was his own opinion also. Yet, with all his well-merited success, it may be doubted whether they were not both of them mistaken. That he had genius was clear enough, and that he was fond of drawing pictures was plain to every one who knew him. But whether his genius would best find its true field in painting the outward or the inward man—faces or characters—that the gossips of Fintry could hardly be expected to determine. It showed some courage then, at that early stage of Scottish art, to devote a boy of thirteen to so precarious a means of living; but it would, no doubt, have looked like very madness to bring him up for the career of a man of letters. Yet, excellent as his portraits are—and some of them caught not the features only, but the very spirit of the sitter—those who knew him, and can remember the delicate shades and dramatic play of character in the stories with which he was wont to brighten our social intercourse, will hardly doubt that his real power lay rather in word-painting than in material pigments. The patient industry which he devoted to art would have made him a subtle dramatist—a writer of such comedies as Scotland has never yet produced, or a novelist to rival her very best. I am not sure, then, that in making an excellent painter of him, we did not lose something greater still, for which nature had specially endowed him.

There was a Glasgow artist, at this time, who bore the honourable name of John Knox, to which, however, he has not added any fresh lustre, for he will probably be known hereafter chiefly as the teacher of Daniel Macnee and Horatio Macculloch. Yet there must have been something in him to have trained two such men. These two formed their life-long friendship in Knox's studio; and many a trip, doubtless, the two lads had together to the lochs of Argyle and Dumbarton, and many a Highland story they picked up, and learned to interpret well the character both of its scenery and its people. Afterwards Macnee came to Edinburgh, and studied at the Academy there, along with Thomas Duncan, Scott Lauder, and David Scott, who all became his warm friends. For there was no mean jealousy in his nature, but he gladly recognised the genius of his compeers, even when their views of art differed wholly from his own. In the end, having been admitted an Academician without passing through the humbler grade of Associate, he settled in Glasgow, till he was elected to the Presidency of the Royal Scottish Academy, on the death of Sir George Harvey in 1876.

It was in Glasgow, then, that his life-work was really done, and probably the necessities of "pot-boiling" dictated the path it was to follow. Now and then, for a season, indeed, he sent for exhibition some simple rural study—"A Peat Sledge," or "A Burnside," or "A Pretty Picture of Children"—which had a touch of pure poetic fancy. But these were short flights into a region which he could not afford to cultivate; and ere long he settled down to the steady business of portrait painting. Rembrandt and Reynolds, Vandyke and Raeburn, have shown that this may be a very noble branch of art; and Macnee's portraits of the late Dr. Wardlaw and Mr. Dalgleish prove that he had no mean idea of the work of his profession. But if painting was the right vehicle for his genius to express itself in, we should have expected to find him rather following in the wake of Wilkie than of Raeburn, and showing on his canvass that dramatic power, and insight into Scottish character, and rarely delicate humour, which were the richest gifts, and most real qualities of his mind. Nothing of this, however, can be found in all his work. Even in painting portraits, though among so many he must have come across some faces which had Scotch character and humour like his own, yet I am not aware of any of his pictures which suggest what a wealth of laughter lay in the man. It would almost seem as if his art was not his natural utterance, but a mere skill of hand, and that this successful painter, after all, had not "found his mission," and has left no real record of his brilliant genius, except in the short-lived memory of his friends. For assuredly, however excellent his likenesses are, and however ably some of them are painted, they give no adequate conception of that singularly rich and fertile and dramatic portrayer of national character, who could so nicely hit off not local dialect only, but local habits of thought, with strokes of finer insight that pierced far into the deepest heart of man. Of all this, however, nothing now remains. No other tongue could reproduce those tales, which had no plot to speak of, which were at times even a mere thread of extravagance, but in which the characters were so felicitously sketched with touches of such kindly humour, that they themselves could only have joined heartily in the mirth which they evoked. For this was a marked feature of his genius; there was not a drop of gall in it. If he saw all the oddities of a Glasgow bailie, an Airdrie miner, a Paisley shopkeeper, a Highland gillie or drover, or minister, "he handled them as if he loved them," and, indeed, he did like them all the better for the flavour of individual character they had.

I would not be understood as anywise undervaluing his artistic powers, which were of no mean order, but they certainly would have attained a still higher rank had his canvas been covered with many figures representing the men who lived so vividly in his stories, and reflecting the dramatic lights in which he could have placed them. Most likely this was at first prevented by the *res angusta domi*, and when easy times came his *role* was already determined for him. So he went on painting portraits—many of them; and making warm friends—many of them, too. Art naturally drew to him Macculloch, Sam Bough, Brodie, and others; and his rare social qualities as naturally associated him with Outram, Glassford Bell, and Norman MacLeod. Brighter evenings there were not in all Scotland than those which brought together the authors of the Annuity and Billy Buttons and Daniel Macnee—and the brightest of them all was Macnee. He was the last of them, too, and perhaps this fact, that he had been left alone by these, his dearest friends, made him more willing at last to leave Glasgow, and take up the burden of the Presidency, even when his own health began to be uncertain.

How he discharged those duties, and commended himself to all his brother artists by hearty kindness and frank recognition of their several powers—how he also interested himself in the meetings and business of our Royal Society—how he soon became as valued a member of general society in Edinburgh as he had been in Glasgow;—all this is known to you all, and all the more is our sorrow that his stay among us was so brief.

DAVID ANDERSON of Moredun. By A. Campbell Swinton of Kimmerghame.

Mr. David Anderson of Moredun, who died in Edinburgh in his ninetieth year, was the eldest son of Mr. Samuel Anderson of Moredun, banker in this city, the head of a family many members of which have been well known and highly respected. Mr. Anderson was long a leading partner in the banking house of Sir William Forbes & Company, and when that firm was, in 1838, merged in the establishment now known as the Union Bank of Scotland, he continued for many years an active director of the new body. There was no citizen of Edinburgh, whose generous aid was more readily given, to every object which commended itself to his approval as likely to benefit his countrymen of any class or condition; and consequently there is no one whose loss will be more seriously felt, when any measure of public utility is in contemplation. He was elected a Fellow of the Society in 1849, but never took an active part in its proceedings. He was, however, a man of cultivated taste and varied information, whose warm heart and genial disposition made him a universal favourite among a large circle of friends. And as one of the Trustees of Fettes College, he showed his interest in the higher education of the country by endowing two scholarships of the annual value of £100 each, with a view of enabling distinguished pupils of that school to prosecute their studies at one or other of the English universities.

JOHN M'CULLOCH. By Francis Brown Douglas.

Mr. John M'Culloch was a native of Galloway, born in 1807. He died at Edinburgh 13th July 1882, in the 76th year of his age. After attending classes at the Glasgow University he came to this city, when he entered the British Linen Company Bank, and remained in connection with it for a period of fifty-five years, much esteemed for his probity and business habits. Many a journey he undertook to bring gold from London for the bank's purposes, and to take it back when no longer required.

He had a kindly feeling for the poor and helpless, and was induced, shortly after coming to Edinburgh, to become a visitor of the Society for Relief of the Destitute Sick. He was appointed its treasurer, an office he filled for nearly forty years, ever seeking to promote the usefulness of that institution in his own way, and to increase its funds. He also latterly took an active part in the management of St. Cuthbert's Parochial Board, being the more interested in this from his connection with the West Kirk session, of which he was an elder for no less than fifty-five years.

Mr. M'Culloch was admitted a Fellow of the Royal Society on 2nd January 1866, and was a very regular attender at its meetings —generally, indeed, present unless prevented by illness. In his later years he was subject to sharp attacks of cold and rheumatism, which much impaired his strength and health, and from one of which, with other complications, arose his last illness and death.

SAMUEL RALEIGH, C.A. By David Maclagan, F.R.S.E.

Mr. Samuel Raleigh was a native of Galloway, having been born on a farm near Castle Douglas held by his father. His early education he obtained in the parish school and high school there; where his brother, afterwards a distinguished Nonconformist divine in London, was being trained at the same time. After a brief apprenticeship to a local solicitor, Samuel Raleigh resolved to go to Edinburgh, and seek there some opening which might afford him an opportunity of securing a position of usefulness and success.

He entered the University as a student at the Law Classes, and at once made his mark by carrying off Professor Macvey Napier's first Conveyancing Prize.

There, as always, he was a man of unwearied industry, and used to say that his object in reading systematically the English Classics was to acquire a good style of composition. Those who remember his power of expression in writing, either on business or more general subjects, will recognise how successfully he achieved his purpose.

Very soon he became partner of Mr. William Campbell of Queenshill, Writer to the Signet, like himself a Galloway man.

It was very well known to Mr. Raleigh's friends that his tastes lay in the direction of figures and finance more than of law alone, and that he possessed a singular proficiency in dealing with them. The offer therefore of a partnership with Mr. Archibald Borthwick —one of the ablest accountants in Edinburgh—was readily accepted by him; and the partnership so constituted, of two men of great powers, and in very many of their special qualities the complement of each other, became one of the outstanding firms of Edinburgh, recognised as such by all professions. The arrangement, however, only lasted until 1857, when the crash of the Western Bank failure led all interested in that calamity to cast about for suitable men to extricate matters, and Raleigh was selected along with other three, who are now each at the head of leading Scottish banks.

The changes in his professional life, which are not always a favourable experience, proved remarkably so with him. He got an insight in business of quite unwonted range and variety; and he was just the man to extract and utilise the best elements out of such a career.

It was not therefore surprising that when in 1859 the office of Manager of the Scottish Widows' Fund Life Assurance Society became vacant, the Directors sought to secure his services. The offer somewhat perplexed him. His professional prospects were so good that he felt it was a doubtful step to enter upon this new life, and he asked and obtained time to consider the proposal. After consultation with friends on whose judgment he relied, he closed with the offer, and became Manager of a Society which, even at that time, stood in the very highest rank among Scottish offices, and which, under his management, was to acquire the position of unapproached pre-eminence which it holds in Great Britain. It was not only, however, the large increase of its business which gave such universal public confidence, but the knowledge of his skill in manipulating and investing large sums of money, and in devising and working out the best ways of distributing the very large profits which accumulated during each septennial period.

Although never taking a public part in political or ecclesiastical affairs, for which he had little leisure and no taste, he took a deep interest in all such matters—held very decided views regarding them—and was often consulted, and always ready with his counsel.

In the year 1880 the labours and responsibilities of his business life began to tell upon him, and he resigned his appointment. His retirement was of short duration; and he died 26th July 1882.

PROFESSOR JAMES SPENCE. By Professor Chiene, M.D., F.R.C.S.E.

James Spence was born in Edinburgh on the 31st day of March 1812. His father sent him, in the first instance, to a boarding-school at Galashiels, and afterwards to the Edinburgh High School. He entered the University at the age of 13, attended the medical classes in the University and Extra-mural School, and obtained the diploma of the Royal College of Surgeons in 1832. His first ambition was to enter the army or navy, and for this purpose he studied in Paris, and passed the examination for a surgeon in the navy. After two voyages to India in troopships, he apparently abandoned the idea of public service, and settled in Edinburgh. It may with truth be said that he then (1835) commenced that career as a teacher and surgeon which paved the way for his appointment as Professor of Surgery in 1864. He first, for seven years, acted as Demonstrator of Anatomy to Professor Monro (*tertius*). He then taught Anatomy in the Extra-mural School until 1849, when, having obtained the Fellowship of the Royal College of Surgeons, he became a Lecturer on Surgery. He held this appointment until his election as Professor of Surgery in 1864. In 1865 he was made Surgeon in Ordinary to the Queen for Scotland. In 1866 he became a Fellow of the Royal Society of Edinburgh.

For nearly half a century James Spence was intimately associated with the teaching of Anatomy and Surgery in this city. From the very first he adopted a course of self-education, and under many difficulties he gradually but surely made his way to the front; and at the time of his death (June 1882) he had attained a position in which he was esteemed by all as the representative of Scottish Surgery. He possessed most marked manipulative skill, and was a very successful practitioner.

He has left, as a result of his long practical experience, a most valuable work on the Practice of Surgery. To tracheotomy, herniotomy, the ligature of vessels, urinary diseases, and methods of amputation, he paid special attention, and has done much to advance our knowledge.

James Spence is an example of a man who slowly rose to eminence by earnest, honest work. He will be remembered as a teacher who had always something worth telling on every practical question, and who told it in a way easily remembered. His systematic lectures were essentially clinical.

Much loved by those who knew him best, his memory will long remain in the Edinburgh school as a faithful teacher, a good operator, and a kind friend.

FREDERICK HALLARD. By Thomas M'Kie, Advocate.

Frederick Hallard, Advocate, senior Sheriff-Substitute of Mid-Lothian, died in this city on 12th January 1882, aged sixty-one. His father was a soldier in the French army, who, after the Revolution of 1793, emigrated to this country, and, along with other Royalist refugees, took up his abode in Edinburgh as a teacher of his native language. Here he married, lived, and died. His son Frederick was born in this city in May 1821. At the age of four, he was taken to Avranches, his paternal home in Normandy; and there, and at Paris, he received a sound and liberal education. At sixteen he returned to Edinburgh. The strong affection he always had for the city of his birth arose not more from admiration of its material beauty, than out of regard for its intellectual renown, and the friendly intercourse which existed between it and France in the olden time. Being destined for the Scotch bar, young Hallard attended the usual classes at the University of Edinburgh, and proved himself a diligent and distinguished student. He was admitted to the bar in 1844, joined the *Speculative Society*, and after acting for some years as a reporter on the *Jurist*, he was, in 1855, appointed by the late Sheriff Gordon junior Sheriff-Substitute for Mid-Lothian. From that time until his death, he discharged the duties of his office with a manly independence of spirit and judicial integrity of purpose, rarely equalled. The year before his judicial appointment, he married Mary Carr Robertson, a daughter of the late Mr. James Robertson of this city. The marriage was one of affection, and for many years was a source of uninterrupted happiness. But of the nine children born of the marriage, death carried off three in as many months; shortly afterwards, the grave was again opened to receive his beloved wife, and in 1873 he had yet again to follow to the tomb his eldest son, Frederick, a youth of great brightness and promise. Against this overwhelming affliction Mr. Hallard bore up outwardly with manly fortitude; but those who knew him best knew too well how the sad ruin of his once happy home haunted his memory, and bowed to the earth a spirit shrinkingly sensitive and keenly affectionate. It was then that he truly felt the consolations of philosophy; for he had loved letters from his early youth with a devotion which grew with his growth, strengthened with his manhood, and continued with him to the end. His literary tastes had adorned and brightened his life in the times of prosperity, and when the sorrowful days came, these tastes weaned him from himself, and gave him comfort, if not consolation. One charm of his society was, that along with a love for all things lovely and of good report, he united in a singular manner, in his own person, two separate nationalities. For his intimate acquaintance with French literature, history, politics, and jurisprudence was happily combined with a wide knowledge of, and a lively interest in, everything pertaining to the literature and jurisprudence of our own country. To his other accomplishments he added a keen relish for classical studies, and particularly Greek.

Besides doing his judicial duties, Mr. Hallard for many years, and until his death, acted as a Director of the Philosophical Institution, and took an active part in the management of its affairs. The useful work he did there cannot be better summarised than in the words of its Vice-President, Dr. William Smith, who at a meeting of the Directors of that Institution thus spoke of Mr. Hallard:—"We can call to mind how much his fine tastes, his varied culture, and his active helpfulness, his ready aid, always willing and gracefully rendered, have contributed to our success. Associated with him as I have been for nearly thirty years, no one knows better than I do how much we have been indebted to him in these respects; and I had looked forward to the time when you might permit me to retire from this chair, which by your favour and indulgence I have occupied so long, and called on him to fill it with new and fresh efficiency."

Mr. Hallard became a Fellow of the Royal Society on twenty-first January 1867. He was proud of its diploma, pretty constant in his attendance at its meetings, but never read a paper, nor took part in the debates. This was partly owing to an inherent modesty of nature, and partly because his knowledge and the bent of his mind were much more literary and philosophical than scientific. He published several able pamphlets on legal topics, one of them being entitled "The Inferior Judge," and he took a prominent interest in all questions affecting a reform of the law. Apart from these he did not write much; yet what he did write showed such vivacity, grace, and culture, that, like the aroma of good wine, it served but to whet the appetite and to make one wish he had written more. But that was not to be; and so he has passed away from among us, still to be held in fond remembrance by a wide circle of friends.

DR. JOHN MUIR. By Professor Eggeling.

Dr. John Muir, who died on the 7th of March last, was born at Glasgow on the 5th February 1810, being the eldest son of Mr. William Muir, at one time a magistrate of that city. After receiving his early education at the grammar school of Irvine and the University of Glasgow, he passed to Haileybury College, then the training institution for the civil servants of the East India Company. In 1828 he proceeded to India, and, having passed with distinction through the College of Fort William, and served for some years as assistant secretary to the Board of Revenue at Allahabad, and afterwards as a commissioner for investigating claims to hold land rent free in the Meerut Division, he was appointed magistrate and collector at Azimgurh. During his occupancy of these posts (a period of some fifteen years) he always devoted a large portion of his leisure to the study of Sanscrit literature; and so well did he succeed in mastering the language, that he himself composed several treatises in Sanskrit metre and prose, viz., a description of England, a sketch of the history of India, and two treatises setting forth the essentials of the Christian doctrines and ethics; and delivered to the students of Sanskrit at Benares lectures in that language on mental philosophy, and kindred subjects (1843).

In 1844 the combination of the hitherto separate Sanskrit and English colleges at Benares was resolved upon, and John Muir was appointed first principal of the institution. In an address delivered by the Hon. James Thomason, Lieut.-Governor of the N.W.P., at the opening of the Benares New College, on 11th January 1853, credit is given to Mr. Muir for having succeeded "in introducing into the college a stricter discipline and a better system of education." This post John Muir held for one year, when he was succeeded by Dr. Ballantyne, he himself reverting to the judicial branch of the service, as civil and session judge at Futtehpore. From his parting address to the students of the Benares College, on the 10th February 1843, I extract the following passages as characteristic of the man:—"Now, I am anxious that your reasonable ambition should be satisfied; I desire to see you all rise to wealth and honour; but I am more solicitous that high principles should now be implanted in your minds, which in after life may bear the precious fruits of integrity, wisdom, and piety. I wish that you should be devoted to study, not so much for the outward advantages it brings, as because you love that truth to which it ought to lead; because you appreciate the most valuable results of education, I mean intelligence, enlargement of mind, the cultivation of your judgment and other faculties; acquaintance with the wonderful works of God, and the laws by which He rules the universe;—above all, because you find that sound instruction is auxiliary to moral improvement. These are the motives which best deserve to be urged at length to stimulate you to the earnest pursuit of knowledge." After a brief outline of some of the chief departments of Sanskrit literature, he continues:—"There is, however, one subject which, more than any other, demands your earnest attention, both during the course of your education and after its close; I mean your moral improvement. If the instruction you have received in the college have not inspired you with the love of goodness, of truth, integrity, justice, purity, and piety, as well as with a desire to practise all these virtues which in theory you admire, it will have effected but little. Mere intellectual, unattended by moral improvement, may render you only more accomplished in wickedness. True wisdom cannot exist apart from goodness. However strengthened by discipline your powers may be, they will always be directed to the attainment of ignoble or comparatively insignificant objects, if they are not guided and hallowed by virtuous principle. True self respect, real happiness, the blessing of God, and your everlasting welfare, all depend on you strictly regulating your lives according to the dictates of conscience and the Divine will."

In 1854, having completed his term of service, John Muir returned to England, and, after a brief residence in London, he settled permanently in Edinburgh. During his last few years in India his earlier literary attempts at religious subjects were followed up by a *Life of the Apostle Paul*, and an *Examination of Religion*, both of them in Sanscrit verse, with English (the former treatise also with Bengali and Hindi) translations. The deep interest which he always took, not only in the moral improvement of the Hindus, but in religious and theological matters generally, led him, in later years, to offer to the University of Cambridge a prize of £500 for the best exposition of the errors of Indian philosophy, and the principles of Christianity in a form suitable for learned Hindus; and to the University of Glasgow a prize of £100 for proficiency in Hebrew scholarship, open to all Scottish graduates in arts of not more than six years' standing. It also prompted him, some years since, to endow, for a period of five years, a lectureship on the Comparative Science of Religion in the University of Edinburgh. Moreover, it induced him to take up the systematic study of the religious literature of India, and the writings of modern European theologians. The results of many years of unwearied research were laid down in a number of papers, mostly contributed to the *Journal of the Royal Asiatic Society*, and ultimately collected in four volumes of *Original Sanskrit Texts on the Origin and History of the People of India, their Religion and Institutions.* This work, of which a revised and greatly enlarged edition, in five volumes, was published in 1868-70, forms by far the most complete and trustworthy digest of authentic texts bearing on the growth of the Brahmanical doctrines and institutions. The amount of patient, methodical research with which the various religious conceptions of the ancient Hindus are traced by him from their first germs through the various phases of development; and the impartial spirit with which he reproduces and examines the often conflicting views of European scholars on single points of Hindu tradition, are beyond all praise. His English translation of the frequently obscure texts, as a German scholar has justly said, "betrays throughout a master's hand." To insure accuracy in his interpretation of difficult passages, Muir would save himself no trouble, but would write letters upon letters to Sanskrit scholars who he thought might be able to clear up his difficulties. I have sometimes heard it remarked that, in dealing with important questions, Muir too often contents himself with stating the conflicting views of others, without giving any decided opinion of his own one way or the other, when he was at least as competent as any other scholar to pronounce on these points. To a certain extent this is no doubt true; but it is only what might be expected from so cautious and conscientious an inquirer, whose sole aim was to get at the truth; and who, while ever anxious to allow every one a fair hearing, shrank instinctively from committing himself to a definite alternative where the available data appeared to him insufficient for forming a conviction. His mind, indeed, was singularly open to argument; it was as free from preconceived ideas as it was disinclined to hasty conclusions. As in his literary inquiries regarding the bygone ages of Indian belief, so in his own religious views, which, it would seem, were somewhat modified, in his latter years, by a close study of modern theological writings. Liberty of research and teaching, in whatsoever department of human science, was to him an article of faith, which neither his natural reserve, nor outside considerations of any kind, could keep him from vindicating. The powerful impetus imparted to the study of the Vedic texts, some thirty years ago, gave rise to an animated discussion as to the degree of authority to be assigned to the traditionary interpretation of the sacred lyrics, as handed down in the native commentaries. Into this literary warfare Muir threw himself with the full weight of his scholarship, in a manner showing how well he knew to fight for the principle of free research, so dear to him. A distinguished Sanskrit scholar had given his opinion to the effect that "in the present stage of Vaidik studies in Europe, it seemed to him the safer course to follow native tradition rather than to accept too readily the arbitrary conjectures which Continental scholars so often hazard." This remark drew forth, after a few weeks, Muir's excellent paper "On the Interpretation of the Veda" (*Jour. of the Roy.*

Asiatic Soc., 1866). Writing with more warmth than he usually displayed in his writings, he therein proved conclusively that it is a mistake to speak of an unbroken chain of Hindu tradition, the meaning of the Veda having already become largely obscure by the time a school of exegesis arose; and that, therefore, the scholars alluded to (viz., Roth and his school) were quite justified in emancipating themselves from the trammels of native tradition, and calling into requisition all the other available resources of philology, thereby laying the foundation of a true interpretation of the Veda.

After the completion of the second edition of the *Original Sanskrit Texts*, Dr. Muir was by no means satisfied to rest on his laurels. He continued his studies as assiduously as ever, though perhaps with a less definite object in view; printing from time to time, for private distribution, small collections of metrical translations of characteristic passages he met with in his reading, generally of a moral or religious tendency. These were ultimately published, in a collected form, in a volume of Trübner's Oriental series, with parallel passages from the Bible and classical authors. In his interesting introduction, he discusses the difficult question as to whether an acquaintance with the Christian Scriptures may have exercised some influence on the religious ideas of the Hindus in the earlier centuries of our era; an influence which has been asserted to be traceable more especially in the Bhagavad-gītā, the famous philosophical episode of the Mahābhārata. Although Muir does not arrive at any definite conclusion on this point, he seems, on the whole, to incline to the assumption of an independent origin of the work in question. The particular object he had in view in making this collection may best be stated in his own words:—"But however the question of the obligations of the Bhagavad-gītā, or of some other parts of the Mahābhārata, to Christianity may be decided, the decision can scarcely affect the determination of the farther and very different question of the originality or otherwise, as far as any foreign influences are concerned, of the great bulk of the moral and religious sentiments embraced in my collection. These sentiments and observations are the natural expression of the feelings and experiences of universal humanity; and the higher and nobler portion of them cannot be regarded as peculiar to Christianity. The correctness of this view is placed beyond a doubt by the parallels which I have adduced from classical writers. It is my impression, however, that the sentiments of humanity, mercy, forgiveness, and unselfishness are more natural to the Indian than to the Greek and Roman authors, unless, perhaps, in the case of those of the latter who were influenced by philosophical speculation. This tenderness of Indian sentiment may possibly have been in part derived from Buddhism, which, however, itself was of purely Indian growth." The publication of this volume seems to have left a void in his mind which, deepened by the loss of his good and gentle sister, who had been for many years the faithful companion of his solitary life, had at times a depressing influence on his spirits. Still, however, he pursued his course of reading, and only a few months before his death he issued to his friends another small collection of metrical translations from the Mahābhārata, including the highly poetical episode of Sāvitrī.

While the literary researches of John Muir have gained for him a place in the foremost rank of Sanskritists, and have thus contributed in a remarkable degree to the credit of Scottish scholarship in an important branch of Oriental studies—as those of his distinguished brother, Sir William Muir, have done in another branch—John Muir deserves to be not less gratefully remembered by his countrymen for the eminent services he has rendered to the cause of education in Scotland. The want of a recognised medium of instruction on his favourite subjects of study in any of the Scottish universities induced him, in 1862, to offer to the Senatus of the Edinburgh University the sum of £4000 for the foundation of a chair of Sanskrit and Comparative Philology; on the condition that the interest of this capital should be supplemented by an annual grant from Government of the same amount. In 1876 this munificent gift was increased by a further sum yielding an addition to the emoluments of the chair of £50 a year. In one respect Dr. Muir's expectations in founding the chair were disappointed. It appears that, in drawing up the deed of endowment, he had intended to provide, beside the systematic courses of instruction, for annual courses of lectures of a more popular kind to be open to any non-matriculated persons that might wish to attend them. Unfortunately, however, the terms of the deed were not sufficiently definite to exclude an interpretation more in harmony with the existing arrangements of university teaching; and, though the question was long and carefully considered by the Senatus—I myself deeming it my duty to support Dr. Muir's interpretation—they found it impossible to consent to what might have proved a somewhat inconvenient precedent. Nevertheless, Dr. Muir continued to the last to show the warmest interest in the objects of the chair, by giving annual prizes for distinguished attainment in the several classes. He also offered a (still available) prize of £100 to the first student that should take the degree of Doctor of Science in the department of Sanskrit and Comparative Philology. To his liberality the University Library owes a very considerable portion of its Oriental and Philological books. The connection of his name with our University, in this respect, has been further strengthened, since his death, through the presentation, by Sir William Muir, of the large collection of Oriental and Philological books left by his brother. In accepting this splendid gift, the Library Committee resolved that this collection, together with the books previously presented by Dr. Muir, should be kept separate from the general library, under the designation of the "Muir Collection." Dr. Muir also took a prominent part in the founding, in 1868, of the Shaw scholarship in mental philosophy (in honour of his uncle, Sir John Shaw, at one time Lord Mayor of London, and a director of the East India Company); and in originating and conducting the Association for Promoting the Better Endowment of Edinburgh University, having acted for ten years as honorary secretary of that most useful society. Dr. Muir's interest and liberality were not, however, confined to the University of Edinburgh; but the other Scottish universities also, I believe, received from him numerous donations of books; and to the Berlin University he presented, a few months before his death, the sum of £50, to form the nucleus for a scholarship in Sanskrit philology. In recognition of his services to higher education, Dr. Muir was appointed a member of the last Scottish Universities Commission. To the report of the commissioners Dr. Muir, in accordance with his principles, added a note urging the consideration of the advisability of the theological chairs in the universities being thrown open to members of all the churches.

John Muir's eminence as a scholar obtained for him the honorary degrees of D.C.L. from the Oxford University, of LL.D. from the Edinburgh University, and of Doctor of Philosophy from the University of Bonn; as well as the title of a corresponding member of the French Academy, the Royal Prussian Academy of Sciences, and a foreign member of the Leyden Society for the Cultivation of Dutch Literature. He joined the Royal Society of Edinburgh in 1861, and at their meeting on Feb. 16, 1863, he read, by request of the Council, a highly interesting paper "On the Recent Progress of Sanskrit Studies." This and several other papers contributed by him were published in the Society's Transactions.

John Muir was loved by all who knew him for his extreme kind-heartedness and truthfulness, his love of humanity, and the purity of his life. His memory ought to be dear to every Scotsman.

DR. CHARLES MOREHEAD. By James Sanderson, F.R.C.S.E., Deputy Inspector-General of Hospitals, Madras Army.

Dr. Charles Morehead, C.I.E., M.D. Edin., F.R.C.P. Lond., and Honorary Surgeon to Her Majesty, was born in Edinburgh in 1807, and died suddenly at Wilton Castle, Redcar, Yorkshire, on the 24th of August 1882, in the 75th year of his age. He was the second son of the Rev. Robert Morehead, D.D., Dean of Edinburgh, and afterwards rector of Easington, Yorkshire. His mother was Margaret, daughter of the Rev. Charles Wilson, Professor of Church History in the University of St. Andrews.

He was educated at the High School of Edinburgh, for which through life he cherished a strong affection, and at the time of his death was one of the very few remaining members of the Carson Club. He entered the medical classes in the University of Edinburgh about 1825, where he distinguished himself as a student more particularly in the science classes. In the early part of his studies he manifested great ardour in the study of clinical medicine, and soon attracted the attention of Professor Alison, whose clerk he became at the end of his course.

Dr. Morehead graduated as M.D. in 1828, and thereafter prosecuted his medical studies for upwards of a year in Paris, under the famous physician Louis, with whom he kept up an intimate correspondence till his death.

At the age of 22, Dr. Morehead entered the Bombay Medical Service, and was soon placed on the personal staff of Sir Robert Grant, Governor of Bombay, and continued to serve in that capacity till Sir Robert's death in 1838. He was president of the Medical and Physical Society of Bombay from 1837 to 1859, and during that time contributed largely to the *Transactions* of the Society. He acted also as secretary to the Board of Native Education from its establishment in 1840 to 1845. In connection with this last subject he long ably advocated in various ways, and through various channels, the opinion that the instruction and education of the natives of India should be through the medium of the English language; and at last, in 1845, had the satisfaction of seeing his ideas carried into practical effect in the founding of the Grant Medical College, one of the chief features of which was the education of the natives by means of the English language. The practice has now for long been universally adopted, with the best results, both as regards the governors and governed of our Indian Empire.

About this time, the large and well-equipped native hospital, named after Sir Jamsetjee Jejeebhoy, was established at the joint expense of the Government and Sir Jamsetjee, for practical instruction in clinical teaching. To Dr. Morehead belongs the merit of introducing this branch of medical training, which at that time did not form a regular part of the curriculum even in the medical schools of the United Kingdom. It was but fitting that Dr. Morehead was appointed first Principal and first Professor of Medicine to the College, and first Physician to the Hospital.

A bust of Dr. Morehead has been placed in the hall of the College as a memorial of its eminent Principal and Professor, by the students and friends of the college.

During these years Dr. Morehead was patiently collecting in the course of his practice as a physician, and from other available sources, observations on the diseases of India, the results of which he published in his valuable work on *Indian Diseases*, a book which still holds its place as a standard authority in the treatment of the tropical diseases of Hindostan. His last service to the profession, before leaving India for England in 1859, was the characteristic one of the formation of a society composed of the old students of the Grant College, which has served not merely as a bond of union, but been also productive of no inconsiderable practical advantages to its members.

On his return from India he was offered the professorship of medicine in Netley Hospital, then just founded, which, however, the state of his health obliged him to decline.

In 1862, he retired from the service with the rank of Deputy Inspector-General of Hospitals; in 1857 he was appointed Honorary Surgeon to the Queen, and in 1881 was made a Companion of the Order of the Indian Empire.

Dr. Morehead will be long and best known by his important researches into the diseases of India, based on a truly scientific diagnosis, and so successfully set forth in his great work on the subject; and by the insight and strength of will by which he succeeded in making clinical medicine so prominent a feature of the medical education of natives in Western India.

It only remains to add that in 1875 Dr. Morehead published the Memorials of the Life and Writings of his Father, the Rev. Dr. Robert Morehead. He was elected a Fellow of this Society on the 15th January 1860.

FRIEDRICH WÖHLER. By Professor Dittmar.

On the 23rd of September 1882, this great man closed his eyes to go to rest after a noble and glorious career in the service of chemical science, extending over two generations. Some sixty years ago, when the elementary nature of chlorine had just been established and the isolation of cyanogen was still a novelty, young Wöhler already worked as an investigator,—the same Wöhler who rejoiced with us over the synthesis of indigo. Of the world of chemical discoveries that lie between he *magna pars fuit.*

To desire to know something of the mould of external circumstances into which such a great life was cast is no vulgar curiosity. The writer, accordingly, had no hesitation in availing himself of an opportunity which presented itself some time ago for obtaining authentic information from Mr. A. Wöhler of Schönhof of Bockenheim, the great chemist's only son. From Mr. Wöhler's letter we extract the following biographical sketch:—

Friedrich Wöhler was born on the 31st July 1800, in Eschersheim, a village near Frankfort-on-the-Main. He received his first instruction from his father, a man well versed in economical and physical science, as also in philosophy and pedagogics; and, besides, attended the village school in Rödelheim, where his father owned a small landed estate. In 1812 the family removed to Frankfurt, where he attended the gymnasium, and by the kindness of a scientific friend, Dr. Buch, who, besides a thorough knowledge of the subjects, possessed the necessary appliances, was introduced to the study of mineralogy, more especially, but also of chemistry and physics. [Conjointly with this Dr. Buch, Wöhler, as early as 1821, published an investigation on "Selenium in a Bohemian mineral,"—his *debut* as an investigator.] After having completed his curriculum at the gymnasium, Wöhler went to the University of Marburg as a student of medicine. In 1821 he left Marburg to continue his studies at Heidelberg, where he took his degree as doctor of medicine but, on the advice of Leopold Gmelin, decided upon devoting himself henceforth to chemistry. He completed his chemical education at Stockholm under Berzelius, in whose laboratory he worked for a considerable time, and with whom, during his subsequent life, he maintained the most friendly relations. While in Sweden he took part in a scientific expedition through Norway, which made him acquainted with the brothers Brogniart and Humphrey Davy.

After his return from Sweden, in 1825, he accepted a call to Berlin as teacher of chemistry in the then newly-erected Gewerbschule, and remained there until 1832, when family affairs caused him to take up his abode in Cassel. In 1836 Wöhler became Professor of Chemistry in the Medical Faculty of the University of Göttingen, which office, in his case, was combined with that of Inspector-General of Pharmacy for Hanover. He held his chair to the day of his death on the 23rd September 1882. After only three days illness he died, deeply mourned by his widow, children, grand children, and great-grand children, in the 83rd year of his life.

To pass now to what for us, as part of the republic of science, is Wöhler's real biography.

The superabundance of experimental genius in the chemical camp must account for the fact that the border-lands between chemistry proper and the collateral sciences of physics, physiology, &c., have been cultivated chiefly by men who called themselves chemists. It is there that Bunsen, Graham, Kopp, Liebig, Regnault, gathered part of their laurels. If it were possible to characterise Wöhler by one stroke of the pen, we should say that of such border-land work he did very little—all his work lies in the very core of the science; but on this only relatively narrow field he simply ranks with Scheele, no other name, except perhaps that of Berzelius, could fitly be placed alongside of these two.

To begin with Wöhler's minor contributions, and at the same time qualify what we have just said of him in a negative sense, let us state that Wöhler, while a student of medicine in Heidelberg, published a thesis on the excretion of substances by the kidneys, for which a prize was awarded to him by the Medical Faculty of that University in 1823. Many years later he resumed this subject conjointly with Frerichs; the memoir is in the *Annalen der Chemie* for 1848 (vol. lxv. p. 325). In this connection we may state that we owe to Wöhler the best method for the detection of arsenic and other mineral poisons in complex organic mixtures. It is described shortly in his *Mineral Analyse in Beispielen.* (The original memoir is in the *Annalen,* for 1849, vol. lxix. p. 364.)

We have not been able to find out exactly what Wöhler did while in Berzelius's laboratory, and presume that, as a sensible man, he there mainly confined himself to learning the great master's methods. Nothing but a short notice on "Improvements in the Preparation of Potassium," dates from the Stockholm period. It is significant, however, as forming the small beginning of a brilliant series of researches on the isolation of elementary substances and their properties, a subject for which he evidently had a great love, as he always comes back to it in the intervals of other work. In 1827 he, for the first time, succeeded in isolating aluminium, the metal of clay, by means of a method which was soon found to be more generally applicable. Alumina, like many other metallic oxides, is not reducible by electrolysis or by the action of charcoal at any temperature. But, when heated with charcoal in chlorine gas, it passes into the state of a volatile chloride. What Wöhler found was that this chloride when heated with potassium or sodium, readily gives up its chlorine and assumes the elementary form. The aluminium which Wöhler thus obtained was a grey powder; but in 1845 he succeeded in producing the metal in the shape of well-fused, fully metallic globules. Wöhler, on this second occasion, correctly ascertained all the properties which everybody now knows to be characteristic of this metal, and it is as well to add that where Wöhler's aluminium differed from what now occurs in commerce under this name, it differed to its own advantage. That Wöhler should not have seen the practical importance of his discovery, is what we refuse to believe; if he never even suggested an attempt to manufacture the metal industrially, this is the natural consequence of the circumstances in which he was placed. For these *we* now should feel thankful; if, instead of quiet little Göttingen, a place like Birmingham had been his abode, he would, perhaps, have been lost to science for all the rest of his life.

The earlier aluminium research was followed, in 1828, by the isolation of beryllium and yttrium. These earlier metal reductions fall into the Berlin period. While in Cassel he worked out processes for the manufacture of nickel free from arsenic, and this laid the foundation for what is now a flourishing chemical industry in Germany. The several methods for the analysis of nickel and cobalt ores which he describes in his *Mineral-Analyse* are, we presume, an incidental outcome of this work. This subject was one of his favourite topics; as late as 1877 we see him coming back to it in the publication of a short cut for the separation of nickel and cobalt from arsenic and iron.

In 1849 metallic *titanium* arrested his attention. Since the days of Wollaston those beautiful copper-like cubes which are occasionally met with in blown-out blast furnaces, had been supposed to be metallic titanium pure and simple. Wöhler observed that the reputed metal, when fused with caustic alkali, emitted torrents of ammonia, and on further inquiry ascertained the crystals to be a ternary compound, containing the elements of a nitride and of a cyanide of the metal. In pursuance of this research Wöhler taught us how to prepare real titanium and really pure titanic acid.

In 1854 Deville's energetic attempts to produce aluminium industrially, caused Wöhler to turn his attention again to this early and almost forgotten child of his genius. His first incentive, no doubt, was the natural and just desire to claim his right as the real discoverer of what Deville, in his ignorance of foreign scientific work, quite honestly thought he had been the first to find out. This priority dispute came to a very satisfactory issue. Deville, after a little pardonable hesitation, bravely acknowledged Wöhler's priority, and the two henceforth were friends and worked together.

The first fruit of this happy union was a memorable joint research (published in 1856 and 1857), which led to their discovery of an adamantine and of a graphitoidal—in addition to the long known amorphous—modification of *boron.* This graphitoidal species subsequently (in their own hands) proved a mistake; but the adamantine modification lives to this day as a true analogue of ordinary (carbon) diamond.

From boron to *silicon* is an easy transition, so we need not wonder at finding Wöhler, in 1857, engaged (conjointly with the physicist Buff) in a research on new compounds of silicon. On electrolysing a solution of common salt with silicon—containing aluminium, as a positive electrode, they obtained a self-inflammable gas which they recognised as hydrogen contaminated with the previously unknown hydride of silicon SiH_4, which body Wöhler subsequently (with the co-operation of Martius) obtained in a state of greater purity. Wöhler and Buff also obtained, though in an impure state, what were subsequently recognised by Friedel and Ladenburg as silicon-chloroform and as silicon-formic anhydride.

Within the limits of this notice we could not reasonably attempt anything like a *complete* account of Wöhler's numerous researches on inorganic subjects; but we must not omit to at least allude to his researches on metallic or semi-metallic *nitrides.* What we know of this as yet little understood class of bodies, with barely an exception, came out of his laboratory, if it was not done by himself in the strict sense of the word.

We also can only refer to the numerous processes which Wöhler, in the course of his long laboratory practice, has worked out for the preparation of pure chemicals, and for the execution of exact analytical separations. Wöhler had better things to do than to take up analytical problems for their own sake; but what he did in this direction incidentally—with his left hand, so to say, while his right was engaged in greater work—amounts to a great deal. With the two exceptions of Heinrich Rose and Robert Bunsen, no man has done more than Wöhler has for the perfection of analytical methods. The analysis of *meteorites* was one of his favourite specialties, and one of his results in regard to these must not be withheld from a Scottish Society. We refer to his discovery of organic matter in a meteorite which he examined in 1864.

If Wöhler had done nothing more than what has been referred to explicitly or implicitly in the above, his work, even for the fifty years of unbroken health which Providence granted him for its execution, would have to be admitted to be both *multa* and *multum*; but far more important than even all that are his researches in *organic chemistry.*

Wöhler's first organic research dates from 1821, when (as a student in Heidelberg) he discovered *persulphocyanic* acid, a compound of sulphur with the sulphocyanic acid which, the year before, had been analysed by Berzelius. But fraught with greater consequences was his discovery of cyanic acid in 1822. Organic chemistry might be said to date from it in two senses. When, in 1828, Wöhler prepared the ammonic salt of his acid, he was astonished to find that the salt, although made by what appeared to be a straight-forward double decomposition, did not exhibit the character of an ammonia salt at all, but turned out to be identical with *urea,* a substance which heretofore had been known only as one of the *organic* components of urine. A momentous discovery for that time! A wide and impassable gulf then, in the minds of chemists, separated the mineral from the organic kingdom. In organic bodies all appeared to be derivable from their elements by a succession of acts of binary combination; the full analysis of such a body contained in itself the full instruction for its synthetical production in the laboratory. Organic substances, on the other hand, were supposed to be things of an entirely different order; in them the few elements which they all consist of, were assumed to be united with one another, each with each, in a mysterious manner, which could be brought about only by the agency of *vital force.* Vital force, it was now seen, had nothing to do with the formation of urea at any rate. The gulf was bridged over, and a great and new morning full of the highest promise dawned over chemistry. If the promise was more than fulfilled, if organic chemistry from a mere possibility developed into a reality, we owe this chiefly to the great researches which were carried out conjointly by Wöhler and Liebig.

Two years after Wöhler had discovered cyanic acid, Liebig and Gay-Lussac inquired into the nature of that dangerously explosive compound known as fulminate of mercury (which had been discovered twenty-four years before by Howard), and proved it to be the mercuric salt of an acid which, although clearly a thing of its own kind, had precisely the same elementary composition as Wöhler's cyanic acid, a result which, at that time, appeared hardly credible. These doubts, however, were set to rest by a joint investigation on the oxygenated acids of cyanogen, which Liebig and Wöhler published in 1830. In their research they proved, both analytically and synthetically, that cyanic and cyanuric acid, although distinct bodies, have the same elementary composition, and that the former, when simply kept in a sealed-up tube, gradually passes *wholly* into a porcelain-like neutral solid, cyamelide, which is widely different from either. By these discoveries, and by Wöhler's synthesis of urea, the fact of isomerism was firmly established. Compared with this great conquest their joint work on mellitic acid (1830), and on sulphovinic acid (1831), appears small; it sinks into insignificance when viewed in the light of their immortal researches on bitter almond oil and on uric acid.

In 1832 bitter-almond oil was supposed to be to bitter almonds what a hundred and one other essential oils are to their vegetable sources. Of its chemistry nothing was known except the fact that it contains loosely combined prussic acid, and that, when kept for a long time, it is liable to deposit a crystalline solid, as various other essential oils do. Liebig and Wöhler, being struck by the absence from even powdered bitter almonds of the intense smell characteristic of the oil, set about tracing the latter to its origin, and soon solved the question. In 1830 Robiquet and Boutron-Charlard had succeeded in extracting from bitter almonds a crystalline nitrogenous solid, soluble without decomposition in alcohol and in water, which they called amygdaline. What Liebig and Wöhler found, was that when bitter-almond meal is mashed up with water, this amygdaline, by the action of the water and a ferment (common to both sweet and bitter almonds), breaks up into sugar, prussic acid, and bitter-almond oil. They also succeeded in separating the prussic acid from the distilled oil, and found the thus purified oil to be a *non*-poisonous liquid of the composition C_7H_6O. This liquid, when exposed to the air, readily takes up oxygen and assumes the form of a solid which is identical, at the same time, with the quasi-stearoptene of the oil and with Scheele's benzoic acid $C_7H_6O_2$. When treated with chlorine the purified oil yields a chloride $C_7H_5O\,.\,Cl$; the chlorine of which, by treatment with the respective potassium compounds, is displaced by its equivalent in bromine, iodine, sulphur, cyanogen, and, on treatment with ammonia, by the group NH_2. Water converts it into hydrochloric and benzoic acids. In all these reactions the group C_7H_5O holds together, it moves forwards and backwards as if it were a compound element. A common-place enough fact in the eyes of the chemical student of 1882, but a most wonderful revelation to the chemist of 1832. Berzelius, who certainly was not much given to dealing in superlatives, greeted the discovery in his *Jahresbericht* as opening up a new era in organic chemistry, and, rejecting the prosaic name of benzoyl which Wöhler and Liebig had given to their radical, proposed to name it proine or orthrine, from πρωΐ the beginning of the day, or orthrine, from ὄρθρος the dawn of the morning.

It is part of the glory of the two men that, in regard to none of their joint researches, the outer world ever had any hint given to it as to what was the one's and what was the other's share in the work although they rarely worked together in the same laboratory. Wöhler would work away in Göttingen and Liebig in Giessen; they only compared notes and slumped the whole into one memoir.

Going by what we know of the genius of the two great men, we should say that in the benzoyl research Liebig's hand is more distinctly visible, while the one on *uric acid* (published 1837) impresses one as having more of the Wöhler element in it. Uric acid was discovered by Scheele in 1776. It is a constant component of urine, but more readily prepared from the excrement of birds and serpents. Its general properties and its relations to bases are all that was known of it when Liebig and Wöhler took it in hand. Apart from an isolated observation of

Brugnatelli's, who as early as 1817 obtained from it, by oxidation, a crystalline product, which he called "erythric acid," Wöhler and Liebig, by, in a sense following in Brugnatelli's footsteps, but looking with sharper chemical eyes, discovered, instead of one, a whole host of derivatives, the disentanglement of which, even to them, must have been a tough problem. But they did not rest before each and every one of the bodies had given a clear account of itself. Liebig, somewhere in his Chemical Letters, *spricht ein grosses wort gelassen aus*, "of any scientific investigation worthy of the name, the main results can be summed up in a few words." It holds for his and Wöhler's case. Uric acid when oxidised behaves as if it were potential urea plus potential mesoxalic acid $C_3O_3.(OH)_2$. Part of the urea comes out as such; the rest unites with the mesoxalic acid into a "ureide" with elimination of water, formed from the two (HO)'s of the acid and two of the hydrogens in one molecule of the urea. This is alloxan (Brugnatelli's erythric acid in a pure state). But alloxan itself, when further oxydised, loses part of its carbon as carbonic acid and becomes *parabanic acid*, the ureide of oxalic acid $C_2O_2(OH)_2$. Either ureide, when treated with caustic alkali, takes up first one and then a second molecule of water to form, in the first instance, alloxanic and oxaluric (hydro-parabanic) acid, in the second, urea plus mesoxalic and oxalic acid respectively. Either ureide, when subjected to reducing agents, takes up one atom of hydrogen per molecule and is reduced, the one to alloxantine, the other to oxalantine. A more limited oxidation of uric acid leads to the formation of allantoine which, before Liebig and Wöhler, had been known only as a component of the allantois-liquid of the cow. These few notes do not pretend to do justice to the great research; but they will suffice to give to the general reader a notion of its importance. Liebig and Wöhler's work—apart from a few isolated though not inglorious attempts—was not continued until Baeyer took it up and rounded it off. Baeyer has enabled us to see clearly certain relations which had before been obscure; but it is worthy of notice that, while overhauling the whole of Liebig and Wöhler's work, he found nothing to rectify; it all proved solid masonry on which he was able to build without resetting a single stone.

After their uric acid research the ways of Wöhler and Liebig diverged. The latter continued to prosecute organic research; the former turned his attention more to inorganic subjects, not exclusively though, as the well-known research on narcotine (which was carried out in his laboratory, part by himself, part by Blyth, and published in 1848) is alone sufficient to prove.

As a *teacher* Wöhler ranks with Liebig and Berzelius. In a sense he was the greatest of the three. Berzelius, we believe, never had the facilities afforded to him for teaching large numbers of students in his laboratory; and as to Liebig, even he lacked the many-sidedness which formed so characteristic a feature in the Gottingen laboratory as long as it really was under Wöhler's personal direction. One student might wish to work on organic chemistry, another on minerals, a third on metallurgy, a fourth on rare elements; let them all go to Wöhler and they all, like the fifth or sixth, would find themselves in the right place.

That Wöhler in these circumstances should have been able to do much of literary work would appear incredible if we did not know it to be so. His *Grundriss der Chemie*, which he published anonymously at first, has passed through many editions and been translated into various foreign languages; never, we are sorry to say, into English. A more valuable teaching book still, and more unique in its character, is his excellent *Practische Uebungen in der chemischen Analyse* (entitled in the second edition *Mineral-Analyse in Beispielen*), which has been translated twice into English, once in this country by Hofmann, and a second time (from the second German edition) in America. To a man like him the compilation of either book probably gave little trouble; what must have taken up a very large portion of his valuable time, are his translations of Berzelius's *Lehrbuch der Chemie*, and of all the many successive volumes of Berzelius's *Jahresbericht*, which works only thus became really available to the scientific world at large. We must not omit to state in this connection that since 1838 Wöhler has been one of the editors of Liebig's *Annalen.*

Wöhler's last publication dates from 1880. It treats of a new kind of galvanic element in which the one metal aluminium serves for either pole. We mention this as showing that he continued working to almost the edge of his grave.

SIR JOHN ROSE CORMACK. By Professor Maclagan.

John Rose Cormack was born on 1st March 1815, on the classic banks of Gala Water, in the Manse of Stow, of which parish his father, the Rev. John Cormack, D.D., was minister. His mother belonged to the old northern clan of Rose, her brother, Sir John Rose of Holm, being a distinguished Indian officer.

Cormack's primary education, like that of so many Scotchmen who have risen to distinction, was got in the parish school; his secondary education at the High School of Edinburgh; and his professional education at the University of Edinburgh, in which he became a student of medicine. During his whole University career he was a hard-working student, and took the degree of M.D. on 1st August 1837, on which occasion he got a University gold medal for his thesis on the subject of Death from the Entry of Air into the Veins. On this subject subsequently, both in a surgical, obstetrical, and medico-legal aspect, he made some further observations in the years 1838 and 1850, and he again made it the subject of a thesis when he took the degree of M.D. of Paris in 1870.

This was not, however, his first attempt at authorship, for he had the year before his graduation gained the prize of the Harveian Society of Edinburgh for an essay on Creasote, which he subsequently published as a thin octavo. It is curious to note the affection which Cormack retained for his first scientific love, for Creasote figures not only in many of his prescriptions in future years, but we find that creasote water (cresylic acid) was used by him in his surgical experience during the siege of Paris in 1871, instead of the closely allied carbolic acid now so familiar to everybody.

Having taken his degree with gold medal honours in 1837, he went to Paris, where he followed out his professional studies, chiefly under Andral as regarded medicine, and Velpeau as regarded surgery. He then returned to Scotland, and determined to settle in practice in Edinburgh, and became a Fellow of the Royal College of Physicians of Edinburgh 2nd February 1841. Practice came scantily, but Cormack could not be idle. He became a lecturer on Medical Jurisprudence in the Extra Academical School, and then he entered upon that course of medical journalism which was a leading characteristic of a great part of his subsequent life. In 1842, under the name of the *London and Edinburgh Medical Journal*, he started that monthly Journal of Medicine, which, under some changes of designation and varieties of editorship, continues to be an important vehicle of scientific and practical medicine; its 334th number being that for April 1883.

In 1842 he was appointed physician to the Fever Hospital in connection with the Royal Infirmary, and in this capacity he had a large experience of the remarkable epidemic of Relapsing Fever, which in 1843 occurred in Edinburgh and other towns in Scotland. The labour which he bestowed on his hospital work, and the accurate details which he preserved of his cases, are a striking character of the hard-working nature of the man. His observations were given to the profession in the form of a book on this epidemic, which had, up to that time, not been so fully and accurately described, and he subsequently published some additional remarks on the subject in the *London Medical Gazette* for April 1849.

Cormack's journalistic venture, and his work as a hospital physician, did not, however, bring him much in the way of practice, and accordingly he migrated to London, where he remained but a short while, settling in practice in its neighbourhood at Putney.

In the English metropolis his journalistic propensities again manifested themselves. Besides writing leaders and other unsigned articles in some of the London medical journals, he became editor of the *Association Medical Journal*, the organ of the Provincial Medical Association. But this he gave up in 1856. The journal was much improved under his management, and still exists as the *British Medical Journal*, the organ of that large and influential body the British Medical Association.

Cormack did not, however, succeed in practice at Putney. His journalism brought him much notoriety and some ill-will, but it was perhaps itself adverse to his success as a practitioner, and it was necessary for him to look to something which would add to the means of maintaining a rising family.

An elderly lady who resided at Tours in France required a British medical man to be always with her, and accordingly he went to France, with the life and language of which he was familiar.

This, however, was a source of income which could not be otherwise than temporary, and in the course of time his patient died, and he had once more to look for a field of practice. He went to Paris, and to enable him to practise there he took the degree of M.D. of Paris in 1870, using for the thesis which he was bound to present to the Faculty the old subject of the Entrance of Air into the Veins, with the addition of his further observations which have been already mentioned. The sun seemed at last to be shining on his side of the hedge. Sir Joseph Oliffe, then the leading English physician in Paris, was old, and soon died, and Cormack got into good practice among the English, and to some extent among the French community. He was appointed physician to the British Embassy, and all seemed to be getting on prosperously with him. But soon the Franco-German war broke out, and with it came the downfall of the Second Empire. Paris was besieged by the Germans, and after this disaster the Commune followed. Cormack's prospects of an easy-going practice were thrown to the winds, and, like every one in Paris, he felt how hard are the uses of adversity. But now it was in this dark hour of disaster that Cormack really came forth in great form and showed what was in the man. Amid the silent horrors of a severe winter, and the loud-sounding horrors of foreign invasion and civil war, he showed that he was a good man, by bringing out of his professional treasure things new and old. It was not now the work of a civil practitioner, but that of a military medical officer, that he had to undertake. If anything be needed to prove the propriety of every aspirant to the medical profession being ascertained, before he gets his degree, to be qualified, not only in one, but in all the practical branches of his profession, Cormack's case would supply it. His whole work hitherto had been essentially that of a physician, he now came out strongly as an operating surgeon, bringing to the front the surgical lessons he had in his youth received from Lister, Syme, and others in the surgical wards in the Edinburgh Infirmary, and some of his cases were really triumphant results of conservative surgery. It was in the *Ambulance Anglaise*, established near his then residence, and maintained entirely by Sir Richard Wallace, that he did his surgical work, and the writer of this notice saw one of his triumphs in the person of the Communist, Alphonse Brunet, whose arm he saved by resection of the shoulder joint after it had been shattered by a rifle bullet For his good and courageous work at this time he was rewarded both by the British and French Governments, being knighted by our Queen, and made a Chevalier of the Legion of Honour.

Peace being at length restored, Cormack returned to his more usual work of physician, but now just as the sun of prosperity had begun to shine upon him, and when he had received honours of which any man might be proud, the end drew near. He had never fairly got over the effects of his exertions during the war. Although still looking fairly well, and in his usual good temper and spirits, he was a sufferer from bladder disease, and he died on 13th May 1882.

This was not the only bereavement which the Franco-German and Commune wars brought upon the Cormack family. In 1842 Cormack had married Miss Hine, the daughter of a merchant at Trelawney, Jamaica. She, too, was one of the victims of these times of political trouble. She never recovered from the effects of the privation and distress to which all Paris at that time had been more or less subjected. The inclemency of a hard snowy winter, the bursting of shells and the rattle of the fusillade, the crash of falling houses, the want of due supplies of food, and the necessity of waiting, sometimes for hours, in the *queue* of persons who had to go, single file, to the bakers' shops to get their loaf of bread, were not likely to leave unshattered the health of a lady born in the West Indies, and who had been the mother of eleven children, and no one therefore need be surprised to learn that in three months Lady Cormack followed her husband to the grave. She died on 19th July 1882.

Cormack had had eleven children, and among his trials of life was the mortality which occurred among them. Two died in childhood, of scarlet fever and typhoid respectively. One who was grown up died in Brazil, of phthisis after yellow fever. In 1876 death dealt heavy blows on Cormack. His daughter, Mrs Lyon, died in India soon after giving birth to a boy, who was a great solace to his grandfather in his last years; and within a week of this event in India he lost in Paris his son Bailey Cormack, who was a promising young member of the medical profession—his father's right hand man in his surgical work in the war time, and whose excellent qualities cannot be better recorded than they are in the following preface to Sir John's account of his patient Brunet, whose case has already been alluded to:—

"For nearly a year I had not seen him (Brunet) till we met on the 29th April 1876, at the funeral of my dear son John Rose Bailey Cormack. Weeping bitterly he grasped my hand, and said, 'I never liked any one so much as Dr Bailey: he did not know what fear was, but he was to me and all the other wounded kind as a brother and gentle as a woman.' In justice to Brunet, I cannot refrain from here placing on record his tender appreciation and beautiful tribute to my late son—my skilful assistant in most trying circumstances—one who was the joy and hope of my life. It is pleasant to record that even men of 'Communistic type' are amenable to kindness, and can love as well as hate their fellow-men."

Shortly after Bailey Cormack's death, his sister Margaret died of pleurisy, induced, it was thought, by nursing her brother.

Five of the family survive, one married and three unmarried daughters, and a son, Charles Edward, who, following his father's footsteps, is now a student of medicine.

Cormack was a voluminous writer, exclusive of what he did in the way of journalism. In 1876, under the title of *Clinical Studies*, he republished his various detached writings in two volumes. These embrace such a variety of subjects besides those already noticed, as cholera, scarlatina, granular kidney, several gynæcological matters, infantile convulsions, diphtheria, syphilis, concussion of the brain, and certain forms of insanity. It can by no means be said that all these are of equal clinical importance, but all of them manifest good observing power and determination to study the subject fully.

It was a considerable shock to many of Cormack's friends to learn after his death that he had left his family in straitened circumstances. It is revealing no secret to mention this, for it was prominently brought forward by the *British Medical Journal* in the very practical form of advocating a memorial subscription for the benefit of Lady Cormack and her family. The way in which this was responded to, showed that Cormack had had many friends who esteemed him highly. It did not surprise those, however, who knew, nor will it surprise any one who hears the narrative of his chequered life, as stated in this notice. It is obvious that Cormack never got into that steady sort of practice which fills the purse. His journalistic work was an impediment rather than a help to him. It is not easy to see why he did not succeed in practice, especially at Putney, where he had a good opening. It was not want of professional knowledge; his writings show that this was full and extensive. It was nothing wrong with his *morale* or his relations with religion, for although he did not carry a broad phylactery, or enlarge the border of his garments, he was essentially a quietly and unobtrusively Christian man. It is neither pleasing nor profitable to pursue this theme, and one can only fall back upon the trite expression of the country of his adoption, that he wanted the "*Je ne sais quoi,*" the absence of which has hindered the success of many a man as full of erudition and observing power as himself.

Cormack was a warm and steadfast friend, and the writer of these lines desires to record that this was the constant relation to himself of the subject of this obituary notice.

SIR CHARLES WYVILLE THOMSON, F.R.SS. L. and E. By Peter Redfern, M.D. Lond.

Charles Wyville Thomson was born on the 5th of March 1830 at Bonsyde, a small property in Linlithgowshire, which had long been in his family. His father was the late Mr Andrew Thomson, who spent most of his life abroad as a surgeon in the service of the Honourable East India Company. His mother was Sarah Ann Drummond, the only daughter of Dr Wyville Smith, Inspector of Military Hospitals. His grandfather was a distinguished Edinburgh clergyman, and his great-grandfather was "Principall Clerke of Chancellary" at the time of the Rebellion of 1745. His father was rather a strict disciplinarian, and expected to see successive distinctions at school and college following in the wake of the admirable education which he placed at the command of his son.

These were stirring times for Scotland. Unembarrassed by troubles from without, her people were continually struggling for intellectual advancement. They furnished and maintained schools of the highest class in the larger towns, and such as offered classical training to the youth, in the whole length and breadth of the country, in preparation for the Universities. In Edinburgh, Glasgow, Aberdeen, and St Andrews, she gave university education to twice as large a proportion of her population as Prussia did; and it is not to be wondered at that her sons have distinguished themselves in every corner of the globe. In settling in the north of Ireland, they introduced order and liberty, manufactures and prosperity, and raised one of its towns at least to take its place amongst the most enterprising and prosperous in the United Kingdom, whilst they themselves neither required soldiers nor police for the maintenance of order and securing the advantages of the administration of just laws. These were the days of Thomson's youth.

The mother's fond affection for her son led her to anticipate his wishes—to supply his wants—and to present him to his father as almost faultless in every relation of his early life. The son's devotion to his parents led him to make many an effort for their gratification, no less than for his own success in life. His early training was at Merchiston Castle School, when it was under the management of Mr Charles Chalmers, brother of the famous divine. Mr Thomas Chalmers, of Longcroft, near Linlithgow, and son of the then proprietor of the school, stated at a meeting of the commissioners of supply for the county of Linlithgow, that "when young Thomson entered the school he himself had passed from being a scholar to the position of a master, and thus became Thomson's first teacher in some of those branches of science in which he afterwards became so eminent." Mr Chalmers adds—"No doubt the lessons he received were of a very elementary description, still I may be allowed to recall with some satisfaction, if not pride, the happy early days of our intercourse, when, with botanical boxes or geological hammers in hand, we rambled on Saturday holidays, or in the long summer evenings, among the woods of Braid and Colinton, or over the uplands of the beautiful Pentland Hills, in search of some of the interesting flora or geological and mineral specimens in which the neighbourood of Edinburgh so richly abounds," and then describes the exultation and satisfaction with which they returned with any new or rare specimen after a long day's excursion. Mr Chalmers says that Thomson was a universal favourite with his schoolfellows, and was highly esteemed by his teachers for his conscientious discharge of every duty.

Shortly after he had entered the University his desire to engage in original work began to show itself in his devotion to the study of botany and zoology. It was his original intention to graduate in medicine, but the attractions of biological science were too great to permit of his devoting any large amount of attention to the other subjects of medical study, and at length he gave up all idea of qualifying as a medical man or entering into medical practice. At this early period his desire to be free from the trammels of customary methods of study, and to trust to his own efforts, was well shown by the reply which Professor Balfour, then Professor of Botany, made to him on his soliciting a certificate of attendance on his class—"I will willingly testify to your knowledge of botany, but I cannot certify that you attended my class." This early formed spirit of self-reliance and determination to investigate natural objects themselves, rather than trust merely to the results of the observations of others, seems to have pervaded his life, and to have led to the urgent requests he continually made for aid to establish collections in public institutions, and at length to the appeal to the Government itself for the means of carrying out what became the most important work of his life, that of determining the physical and vital conditions which prevail at different depths of the ocean.

I first met Wyville Thomson at the house of my late dear friend, Professor J. H. Bennett, at the time of the meeting of the British Association in Edinburgh in 1850, when the friendship commenced which remained unbroken for a single hour during the whole of his life. I was greatly impressed with his knowledge of botany, and with the energy and determination in the pursuit of science of one who appeared to me to have the most tempting professional career open before him.

Dr Dickie had been removed from the University and King's College, Aberdeen, to the chair of Natural History in Queen's College, Belfast. Finding that Thomson had no disinclination to devote himself, for some time at least, to scientific work, I had the pleasure of recommending him for the vacant lectureship, and seeing him start on the career which ended so brilliantly but prematurely. In 1851 he was prevailed on to leave King's and to lecture in Marischal College, Aberdeen, where he continued to study his favourite subjects and to teach botany until 1853, when he was selected by the Crown as the successor to the Rev. Wm. Hincks, F.L.S., in the chair of Natural History in Queen's College, Cork.

The charming flora and fauna of Aberdeen, which had been laboriously worked for years by Dr Dickie, who had indicated the spots where the most interesting specimens were to be met with, was open and ready for further examination by the more daring and speculative spirit of Thomson. It was not long before a visit to his study possessed the greatest attractions and charms. Around the room, on shelves, tables, and floor alike, there lay, in what would have seemed to a casual observer the most grotesque confusion, the treasures of description and illustration of the most eminent naturalists of the day and of former times. The shelves and mantelpiece were, shortly, crowded with selected and neatly preserved specimens of Polyzoa and sertularian zoophytes taken in the neighbourhood, picked off the fishermen's lines, or dredged up by Thomson himself; here and there lay heaps of plants already in their places in the herbarium, or in process of preparation for being preserved; and, what was more charming than all, there were bowls and dishes and aquaria of all kinds, containing the actual living specimens which were being examined, and of which the characters were rendered permanent by the naturalist-artist himself in the most beautifully executed drawings. Amidst all these signs of true scientific work there were indications of the enjoyment which the tenant of this sanctum himself derived from indulging in his natural tastes. The specimens of the most elegant forms were always in the foreground; there never failed to be seen two or three rare or beautiful flowers, made ten times more beautiful than ordinary by the tasteful way in which they were displayed, whilst the newest photographs or sketches of the glens or other scenery in the neighbourhood found a home on any unoccupied spots there chanced to be on the walls. Those who had the privilege of witnessing the progress of this happy life, of noticing how the varying forms of these elegant sertularians gradually proclaimed their mode of development, how their myriad medusoids were produced, at length set free, and then settled in life, under the observation of the loving intruder into their inner life, could not but wonder how time was obtained for all this varied work, attended as it was with the enjoyment of the pleasures of social life, and with that of adding to those pleasures the charms of wit, of elegance, and manner of one who was equally at home, and even more happy, in the society of ladies and educated men than in the company of his home family of zoophytes, or other of the lower forms of living beings.

Thus two or three of the earlier years of the public life of Wyville Thomson were spent. They produced many papers of great interest, which were published in the *Annals of Natural History* and other periodicals, and gave birth to very noticeable philosophical speculations on the development of certain medusoid forms, startling many older naturalists, and only partially accepted by others, such as Johnston of Berwick-upon-Tweed, and Edward Forbes, who considered them too daring advances on what was then known of the modes of life of those beings.

On leaving Aberdeen, Thomson had secured a large number of sincere friends to whom his departure was a great loss. His kindness of heart and his many estimable social qualities had made him desired in every circle, whilst in both the colleges to which he had been attached he was looked upon as a rising naturalist, destined to attain great eminence as years advanced. The degree of LL.D. was conferred upon him by Marischal College, Aberdeen.

In Cork, to the duties of teaching botany, those of teaching zoology were added, and both were discharged with equal vigour and success. But other changes were awaiting him. Early in 1854 he married Jane, the elder daughter of Adam Dawson, Esq., deputy lieutenant of the county of Linlithgow, and proprietor of Bonnytown, the neighbouring estate to Bonsyde. As the friend of the bridegroom, I had the pleasure of participating in the great gathering of members of the county families, and of Thomson's numerous Edinburgh friends, to celebrate what was deemed a most auspicious union of two families, both held in high estimation by all who knew them. In the same year the chair of Mineralogy and Geology in Queen's College, Belfast, became vacant by the resignation of Professor Frederick M'Coy, who was elected to a professorship in the new University of Melbourne, and Thomson was then transferred from Cork to Belfast.

The studies incident on the occupation of the chair of

Mineralogy and Geology and the charge of the Natural History Museum, following in succession on the study of Botany and Zoology, the subjects of Thomson's former chairs, now completed his training as a Professor of Natural History. He devoted much time and attention to Palæontology, and thus, in comparing the old world forms with those at present existing, obtained much useful insight into the relations between them. Under his guidance the Museum of the College was greatly enlarged, especially in the departments of Zoology and Palæontology, and his efforts in this respect received the hearty co-operation of the president and vice-president. Specimens for teaching and for the enrichment of the museum were sought for everywhere, and properly arranged and classified. Whatever new objects possessed unusual interest were made the subjects of papers read before scientific societies, or published in the journals of the day. It was at this time that a paper appeared on a genus of Trilobites; this had been read before the London Geological Society. Another, on a fossil Cirriped, was published in the *Annals of Natural History*. One can well imagine the growing consciousness of power in dealing with fossil forms which Thomson's previous knowledge of the existing living forms gave him, and that, as the accumulation of specimens proceeded, the series would be seen to be in certain parts more or less complete, whilst in others it would be found wanting, and thus the necessity of further investigation would be pointed out. It was natural that, when he came to the collection and investigation of the numerous varieties of extinct forms of echinoderms, the eye which was always open to the charms of beauty should have been arrested, and that it should have occurred to him that what was needed for a complete understanding of them was a correct knowledge of everything which their living forms could teach. From this time he returned to his study of the development of the larval forms of these low organisms, especially with reference to Comatula and Pentacrinus, no doubt with the hope of arriving at some general conclusions as to the relations of their peculiar mode of development with that of the higher animals, and of showing their connection with extinct forms.

Mr J. V. Thomson had found his *Pentacrinus Europæus* in the Bay of Cork in 1823, and was thus the first to discover a recent encrinite in the seas of Europe, as he was the first who ever had the opportunity of examining one in its living state. As the result he declared it to be the young of Comatula, and, comparing his youngest Comatula with the oldest Pentacrinus he could find, he demonstrated this relation to the satisfaction of Professor Edward Forbes, Dr Ball of Dublin, and the late William Thompson of Belfast. Yet much remained to be done to clear up the whole history of this single form, and this occupied Wyville Thomson for several years. A sketch of his "On the Embryogeny of *Comatula rosacea*" appeared in the *Proceedings of the Royal Society* for 1858, a paper "On the Embryology of *Asteracanthion violaceus*" was published in the *Microscopical Society's Journal* for 1861–62, and his paper "On the Pentacrinoid Stages of Comatula" was sent to the Royal Society in December 1862, read in February 1863, and published in the *Philosophical Transactions* for 1865. This paper is a model of care and accuracy, illustrated by many beautiful and highly artistic drawings of the various stages, executed by the author, and itself attests his powers of research and his accuracy of discrimination and delineation. Whilst engaged in this work, Thomson accumulated a large amount of material, with a view to give an account of the whole genus Pentacrinus at some future time. Indeed, as far as these researches on development are concerned, it is almost to be regretted that they so soon led to the great work of deep sea research, which, when once entered upon, took up so large an amount of time.

In a correspondence with Michael Sars, the celebrated Professor of Zoology in the University of Christiania, Wyville Thomson learned that the professor's son, M. Oscar Sars, whilst engaged, as one of the acting Commissioners of Fisheries, in a series of investigations as to the fisheries off the Loffoten Islands, north-west of the coast of Norway, had dredged up from about 300 fathoms a number of living animal forms. In response to an invitation from Professor Sars, Thomson visited Norway to examine these objects, and he states that amongst them there was a small crinoid of surpassing interest, which they at once recognised as a degraded type of the Apiocrinidæ, an order which had up to that time been regarded as entirely extinct. Some years previously M. Absjörnsen, dredging in 200 fathoms in the Hardangerfjord, procured several examples of a starfish "Brisinga," which seems to find its nearest ally in the fossil genus Protaster. In this way it had become certain that animal life does not cease in the ocean at a depth of a few hundred fathoms, as the late Edward Forbes had supposed. Wyville Thomson tells us that, long previously to 1868, he "had a profound conviction that the land of promise for the naturalist, the only remaining region where there were endless novelties of extraordinary interest ready to the hand which had the means of gathering them, was the bottom of the deep sea." And when, in his visit to Norway, he became fully acquainted with the advantages which Professor Sars and his son had enjoyed through the means of their Government, he resolved to lose no opportunity of pointing out how greatly the Government of the most powerful maritime nation in the world might aid science by placing at the disposal of naturalists one of their numerous unemployed vessels to assist in the exploration of the ocean depths. A favourable opportunity presented itself when engaged with Dr W. B. Carpenter in working out the structure and development of the Crinoids in the spring of 1868. Dr Carpenter was a vice-president of the Royal Society, through which body alone it seemed that the Government could be influenced. He considered the subject carefully, and having arrived at a conclusion favourable to the project, it was resolved that he should bring the subject under the notice of the Society, introducing it by a letter which his colleague was to write to him after his return to London. The Royal Society and the Government entered heartily into the plan, and the dredging cruises of H.M.S. "Lightning" and "Porcupine" and the expedition of the "Challenger" were the result.

It has been already stated that Wyville Thomson was appointed to the chair of Mineralogy and Geology in Queen's College, Belfast, in 1854. On the removal of Dr Dickie to Aberdeen in 1860, the duties of the chair of Botany and Zoology were also entrusted to him, and he became from that time Professor of Natural History in these four branches. For the discharge of these duties he was very peculiarly fitted from the happy way in which he had at different times been called upon to teach the four subjects in succession. He had now the entire responsibility of the department of Natural History. In the year 1860 he was admitted to the degree of LL.D.

in the Queen's University *ad eundem*. As a resident in Belfast he entered heartily into every plan for the spread of knowledge or the improvement of his townsmen. He was an active member of the Natural History and Philosophical Society, and at its meetings he contributed many valuable papers. As a lecturer he was fluent in style, easy in manner, and lucid in thought and expression. He conveyed to his hearers much of the interest he had in his subject, and encouraged them to engage in original work. He was instrumental in placing the School of Science and Art in its present relation to South Kensington, and took a constant and lively interest in its success.

He was an active member of the local committee in connection with the meeting of the Social Science Congress in Belfast, under the presidency of the Earl of Dufferin, in 1867.

Interested in education, and attached to the system on which the Queen's Colleges and Queen's University were founded, he strenuously opposed all attempts to interfere with their academic character or their privileges. When a supplemental charter was issued, which it was believed would lessen the necessity for thorough academic training to obtain degrees in the Queen's University, Wyville Thomson came forward very prominently, and succeeded in collecting large funds, and obtaining still further guarantees from an influential committee, which enabled the validity of the charter to be tested in the Court of Queen's Bench. The result was that, after long and protracted arguments, an injunction was granted in 1867 by the Master of the Rolls which rendered the supplemental charter inoperative, and helped to prevent for many years the substitution of a system of mere examinations for the most complete academic training which prevailed in any university.

Regardless of the differences of religious and political opinion which prevailed in Belfast, he was courteous to all, tolerant of every opinion frankly formed, and never obtrusive of his own. He was esteemed by all classes and parties, he had friends everywhere, and his house was always open to all of distinction in science or art who might happen to visit Belfast. Engrossed in his own proper studies, he never obtruded them upon others, but whenever assistance or advice in connection with them were needed, he spared no pains to make both effective. His tact, consideration, and good taste never failed him. His passion for flowers seemed a part of his nature; he cultivated them with the greatest care, and, though delighting to display them to the greatest advantage in his own house, he enjoyed equally his regular practice of carrying any particularly choice specimen he might have grown to present it to some of his many friends.

In 1867 he was made Vice-President of the Jury on Raw Products at the Paris Exhibition.

On the 30th May 1868 he addressed the letter to Dr Carpenter which was previously agreed upon, pointing out that Edward Forbes's conclusion, that a zero of animal life was reached at a depth of a few hundred fathoms, was incorrect, as had been proved by M. Absjörnsen's dredging starfishes at 200 fathoms, and by M. Oscar Sars dredging living crinoids from 300 fathoms; that the effect of pressure has probably been greatly exaggerated, because an equal pressure within and without by water would probably produce no injurious effect on animal life, and might even contribute to increase the æration of the water; and that, looking at the condition of the cave fauna, it is probable that the diminution of light at great depths may only affect the development of colour and of the organs of sight. He suggested that, whilst dredging at 1000 fathoms was quite beyond the reach of private enterprise, it was quite practicable if the Admiralty could be induced to grant the use of a vessel for the purpose. He proposed to start from Aberdeen, to go first to the Rockall fishing banks, and thence north-westward towards the coast of Greenland, rather to the north of Cape Farewell.

Dr Carpenter wrote to General Sabine enclosing Professor Wyville Thomson's letter, pointing out the admirable results obtained by M. Sars, with similar aid granted by the Swedish Government; and showing that he and Dr Thomson had restricted their request within such conditions as could, without great expense or inconvenience, be acceded to by the Admiralty. On the evening of the day on which Dr Carpenter's letter was written, General Sabine brought the subject under the consideration of the council of the Royal Society, who at once approved of the proposal, recommended it to the favourable consideration of the authorities of the Admiralty, and advanced a sum of £100 to meet expenses. The

Lords Commissioners of the Admiralty wrote on the 14th July that they had given orders for Her Majesty's steam vessel "Lightning" to be prepared immediately at Pembroke to meet the wishes of the Royal Society. The "Lightning" left Pembroke on the 4th August 1868. Drs Carpenter and Thomson, and Dr Carpenter's son Herbert, joined the vessel at Oban, whence they sailed on the 8th August. They reached Stornoway on the 9th, and left it for the north on the 11th. On the same afternoon they dredged in 60 to 100 fathoms; on the 13th in 450 fathoms, finding no bottom, but the high temperature of 9·5° C.; afterwards in 600 to 700 fathoms in the same locality. Bad weather frequently impeded the dredging operations. On the return of the vessel to Stornoway on the 9th September, Dr Wyville Thomson was obliged to leave her to attend to duties in Dublin, but Dr Carpenter remained with the vessel, left Stornoway again on the 14th September and dredged in 650 fathoms, but on the 21st the weather was so bad that the work had to be concluded. There were only ten days available for dredging in the whole six weeks, and on only four of these was the vessel in water over 500 fathoms deep. Yet a fair measure of success had been achieved.

It was shown that varied and abundant animal life, represented by all the invertebrate groups, occurs at depths in the ocean down to 650 fathoms at least; and that, instead of deep sea water having an invariable temperature of 4° C., great masses of water, at temperatures varying from 2° C. to 6·5° C., maintain a remarkable system of oceanic circulation, and yet keep so distinct from each other that both may be found within the limit of an hour's sail. It was also ascertained that a large proportion of the forms living at great depths of the sea are of unknown species, and identical with tertiary fossils previously believed to be extinct.

The next year, 1869, saw Wyville Thomson again engaged in the examination of the physical, chemical, and biological conditions of the ocean depths, for the Lords Commissioners of the Admiralty had acceded to the additional request of the council of the Royal Society and had set apart the "Porcupine," a small vessel fitted up for surveying purposes and admirably adapted for the continuance of these researches, from the beginning of May to the middle of September. As it was impossible for those connected with the previous expeditions to be absent from their public duties for any large portion of this time, it was resolved that there should be three separate cruises, one on the west coast of Ireland, the Porcupine Bank, and the channel between Rockall and the coast of Scotland, under the scientific charge of Mr Gwyn Jeffries, F.R.S.; a second to the north of Rockall, leading northwards to the point where the expedition of 1868 left off, under the charge of Dr Thomson; and the third to work over the "Lightning Channel" and check the former observations, under the direction of Dr Carpenter.

Mr Gwyn Jeffries was favoured with remarkably fine weather, and found it possible to dredge during seven days at depths greater than 1200 fathoms, and on four days at less depths. His deepest dredging was 1476 fathoms, and the whole of them yielded an abundance of novel and interesting results in every invertebrate sub-kingdom.

Captain Calver was accustomed to minute accuracy in surveying, and thoroughly versed in the use of instruments and in the bearings of scientific investigation. His crew were chiefly known and tried men, Shetlanders who had spent many successive summers in the "Porcupine" under his command. Aided by a staff of zealous officers, Captain Calver soon obtained so entire a mastery over the operation of dredging that he made it almost a certainty at depths at which this kind of exploration would have been previously deemed out of the question. Wyville Thomson at once recognised these favourable conditions, and having found that the experiences of the previous year, and all their anticipations for the present, had been realised, at least for the depth of nearly 1500 fathoms, and that even at that depth nearly all the types of living marine invertebrata were represented, though the number of species seemed reduced and the size of the animals dwarfed, he suggested that it would be desirable that the second cruise should be made in deeper water than had originally been intended, and pointed out the position of the deepest water easily accessible, 250 miles west of Ushant, as a fitting place for the next observations.

The Hydrographer cordially acquiesced in this proposed change of plan, and it was arranged that the next dredging should be done at this spot, in water 2500 fathoms deep. Professor Wyville

Thomson left Belfast in the "Porcupine" to take the scientific direction of this cruise on the 17th July 1869, taking with him Mr Hunter, F.C.S., chemical assistant in Queen's College, Belfast, to examine and analyse the samples of sea water. At Queenstown Mr P. Herbert Carpenter joined the ship to practise the gas analysis which he was to undertake on the third cruise.

The vessel proceeded on her voyage at 7 P.M. on the 19th July, steaming in a south-westerly direction across the mouth of the channel. At 4.30 A.M. on the 21st they were still only on the plateau of the channel in 95 fathoms of water, but from midday to the afternoon they passed over the edge of the plateau and dredged in 725 fathoms, the bathymetrical horizon of vitreous sponges in the northern seas, bringing up several specimens of these beautiful forms, and a slight admixture of globigerina ooze in sand. On the 22nd they were in water of about the greatest depth they had reason to expect, 2435 fathoms, at a temperature of 2·5° C. A successful dredging yielded 1½ cwt. of grey chalk mud, containing examples of each of the invertebrate sub-kingdoms, which, though dead, had evidently been alive when they entered the dredge. Similar results attended a dredging on the 23rd at the same depth, after which the party returned to the coast of Ireland, dredging and noting the results at intervals on the way. The vessel reached Cork on the 2nd August, and Belfast on the 4th.

She left again on the third cruise for the year, on the 11th August, under the direction of Dr Carpenter, Mr P. H. Carpenter undertaking the analyses, and Wyville Thomson accompanying them. He busied himself in drawing, naming, and describing new species, and in noting the great general features of the prevailing physical and vital conditions. It is scarcely possible for anyone, however little imaginative, to read the graphic accounts of the incidents of these voyages without having his enthusiasm aroused, and almost wishing to have been present on many of the occasions so forcibly depicted. It seems more like a dream than a reality that at a single haul the dredge should have brought up in its bag and on its tangles not less than 20,000 specimens of the pretty little urchin, *Echinus norvegicus*, and we have Dr Thomson's authority for such an event having happened. On other occasions, one is irresistibly brought to watch, with bated breath, the landing of the great prizes which the dredge had collected. His account of the glimpses from time to time as the dredge was coming in, of what seemed to be a large scarlet urchin, the disappearance of it now and then as if lost altogether, then its quiet settling down as a round red cake, and beginning to pant,—that he had to summon up some resolution before taking the weird little monster in his hand,—show the graphic power of the author no less than the enthusiasm of the naturalist.

I cannot forbear giving another illuatration:—"I do not believe human dredger ever got such a haul. The special inhabitants of that particular region—vitreous sponges and echinoderms—had taken quite kindly to the tangles, warping themselves into them, and sticking through them and over them, till the mass was such that we could scarcely get it on board. Dozens of great Holteniæ, like

> Wrinkled head and aged,
> With silver beard and hair;'

a dozen of the best of them breaking off just at that critical point where everything doubles its weight by being lifted out of the water, and sinking slowly away back again to our inexpressible anguish; glossy whisps of Hyalonema spicules; a bushel of the pretty little mushroom-like Tisiphonia; a fiery constellation of the scarlet *Astropecten tenuispinus;* while a whole tangle was ensanguined by the 'disjecta membra' of a splendid Brisinga."

The effect of the brilliant phosphorescence of the contents of the dredge are vividly pourtrayed; and the argument in favour of the urchins, which are only one-fourth of the size of others whose characters are indistinguishable from theirs, being dwarfed specimens of the same genus, is not easily forgotten:—"The Shetland variety of *Equus caballus* is certainly not more than one-fourth the size of an ordinary London dray-horse, and I do not know that there is any good reason why there should not be a pony form of an urchin as well as of a horse."

Wyville Thomson had arranged with his colleagues to take part in an exploration of the deep sea to the south of Europe and the Mediterranean in 1870, but he was prevented from doing so by an attack of fever. Yet he gave at second hand a brief account ot the first part of the work under the direction of Mr Gwyn Jeffries to complete his sketch of the condition and fauna of the North Atlantic; and directed attention to the entirely exceptional conditions of temperature and animal life observed by Dr Carpenter in the Mediterranean as compared with the outer ocean.

In the whole life of Thomson, notwithstanding his vivid appreciation and accurate descriptions of the most minute details of structure necessary for the determination of new species, and for allotting them their proper position in nature, he never allowed himself to be dragged down to the level of a mere collector, accumulating myriads of individual objects and cataloguing them. He invariably rose superior to details, and, subordinating them as merely means for arriving at just conclusions regarding the physical and vital characters of the earth and its living freight in long past ages or the present time, he devoted his best thoughts to the consideration of the means by which great results might be achieved. The idea that either individual or even imperial aid was necessary neither occasioned him anxiety nor discouraged him; he resolutely set forth the conditions, showed how important results could be arrived at, and the means never failed him.

His discussion of the effects of the Gulf Stream on the climate of the coasts of Northern Europe, in comparison with the influence of any possible general ocean circulation, is a good illustration of his wide and powerful grasp of natural phenomena bearing on any particular point. He had measured in the North Atlantic the extent of the warm and cold areas of water, and recognised the fauna which are proper to each; he had determined the existence of the vast layer of cold water, 1500 fathoms thick, at the bottom of the Bay of Biscay, and that the temperature there at 1230 fathoms from the surface is the same as that of the bottom off Rockall; he saw that, whilst the communication of the North Atlantic and the Arctic Sea is restricted, the communication with the Antarctic basin is, as he describes it "open as the day,"—a continuous and wide valley, upwards of 2000 fathoms in depth, stretching northwards along the western coasts of Africa and Europe; and then pointed out how much less startling than it appears at first sight is the suggestion that the cold water filling deep ocean valleys in the northern hemisphere may be partly derived from the southern. He calls to mind that the floor of the Atlantic is covered by a creamy, flocculent layer of microscopic animals; whilst, wherever there is any known current, this deposit is absent and replaced by gravel, and thus shows that the movement of any cold indraught of water at the bottom must be excessively slow. He dispels the chimerical idea that there is a kind of equatorial diaphragm between the northern and southern ocean basins, and explains that it is only on the surface of the sea that a line is drawn between the two hemispheres by the equatorial current. He then gives as evidence of the slow indraught of cold water from the Southern Sea, that it is colder than the mean winter temperature of the area which it occupies and that of the crust of the earth, and that its temperature rises as it is traced northward; whilst, owing to Behring's Straits being only 40 fathoms deep, there is no adequate northern source of such a body of cold water.

In 1869 Wyville Thomson was elected a Fellow of the Royal Society; and in the year following, on the resignation of Dr Allman, he was appointed Professor of Natural History in the University of Edinburgh. His friends in Belfast recognised the distinction which had thus been conferred upon him, but felt the loss which the college and the town had sustained by his removal, and, on taking leave of him, presented him with a handsome service of plate and an illuminated address at a public meeting presided over by the mayor. The honorary degree of D.Sc. was conferred upon him by the Queen's University about the same time.

His duties now became more arduous than ever. His class-room was crowded with students, whom he taught not merely by lectures but by practical demonstrations. In 1871, the meeting of the British Association in Edinburgh, the arrangement and plans of the new University buildings, troubles in connection with the admission of females to the college classes, and the transfer of the Museum of which he was Regius Keeper, to the Museum of Science and Art, added greatly to his necessary labours.

At this time the rapid extension of ocean telegraphy gave practical value to everything which concerned the depth of the ocean, the character of its bottom, and the presence there of animals which might injure the coverings of telegraphic cables, whilst great interest was being manifested by the public in the remarkably novel experiences of the cruises of the "Lightning" and the "Porcupine."

From America and from Europe more or less effective expeditions had been sent out, but it was evident that it rested very specially with England to lay down the first broad outlines of the physical and biological conditions of the bottom of the ocean.

The circumstances were very propitious; and when Dr Carpenter addressed a letter to the First Lord of the Admiralty, urging the despatch of a circumnavigating expedition for this purpose, their lordships, after a favourable report of the Hydrographer to the Navy, agreed to despatch such an expedition, if the Royal Society recommended it and furnished them with a feasible scheme.

Mr Lowe, then Chancellor of the Exchequer, with great interest and sagacity, saw that such an enterprise was entirely beyond the reach of private means, and agreed to furnish the necessary funds. The "Challenger" was chosen for the purpose, with Captain Nares, a surveying officer of great experience and skill, to command her, and Professor Wyville Thomson as director of the Civilian Scientific Staff. He tells us that "when the suggestion was made to him at the commencement of the negotiations to join the expedition, the sacrifice appeared in every way too great; but as the various arrangements progressed, so many friendly plans were proposed on all hands to smooth away every difficulty, that he finally accepted a post which, to a younger naturalist, without the ties of a family and a responsible home, would be perhaps among the most delightful the world could offer."

The President and Council of the Royal Society nominated the members of the Civilian Scientific Staff, and a Circumnavigating Committee, amongst whom were Dr Carpenter and Dr Wyville Thomson, suggested a scheme whereby it was believed the best results might be obtained. Sixteen of the eighteen large guns which the "Challenger" carried were removed; she was fitted with a natural history workroom, a chemical laboratory, and furnished with every scientific appliance to the satisfaction of the director, and in a way entirely unprecedented for scientific purposes. With a ship thus equipped, and the responsibility of directing the most delicate and difficult scientific observations at sea for a period of three or four years, Dr Wyville Thomson left Portsmouth on the 21st December 1872 with the good wishes and ardently expressed hopes of every lover of science in Great Britain.

The first part of the voyage, that to the Canary Islands, was made merely tentative, with a view of getting everything on board into perfect order for correct observations, and dividing the labour of research in the most convenient way amongst the members of the staff.

On the 14th February 1873 the "Challenger" sailed from Santa Cruz to cross the Atlantic, and the real work of the expedition commenced. She reached Sombrero on the 15th March, the Bermudas on the 4th April, and Halifax on the 9th of May. Leaving Halifax again on the 15th, she went southwards and back to the Bermudas, to make another section of the Gulf Stream. On both occasions the most detailed and interesting observations were made. Subsequently she crossed the Atlantic three times, visited Australia, New Zealand, the Malay Archipelago, Hong Kong, and Valparaiso, sailing altogether 68,930 miles, and returning to Sheerness on the 24th May 1876, after an absence of three years and a half.

Shortly after his return, Dr C. Wyville Thomson received the honour of knighthood, and was appointed by the Lords Commissioners of Her Majesty's Treasury "Director of the 'Challenger' Expedition Commission." In the same year he was awarded a Royal Medal by the Royal Society for his successful direction of the scientific investigations carried on by H.M.S. "Challenger."

In July he and the other members of the scientific staff of the "Challenger" were entertained at a banquet in Edinburgh. On going with Emeritus Professor Balfour to Upsala, as the representative of the Senatus of the University of Edinburgh on the occasion of the tercentenary of that ancient University, the King of Sweden created him a Knight of the Order of the Polar Star. He was a Fellow of the Royal Societies of London and Edinburgh, a Fellow of the Royal Irish Academy, Ph.D. Jena, Fellow of the Linnean, Geological, Zoological, and Palæontological Societies of London, and of various foreign and colonial institutes. In 1877 he was appointed to deliver the Rede Lecture at Cambridge, and in 1878 he presided over the Geographical Section of the British Association at its meeting in Dublin, and was made LL.D. of the University of Dublin.

Sir Charles discharged the duties of his chair with his customary vigour on his return from the voyage of the "Challenger," and worked laboriously at the vast amount of material and observations which had been accumulated. In 1877 he published two volumes of a preliminary account of the results of the voyage, a work of surpassing interest, not alone from the scientific value of the observations recorded in it, and the conclusions which the author draws from them, but for the beautifully executed illustrations it contains, and the graphic sketches which occur here and there of the general as well as the scientific features of the places visited and examined. In this work Sir Charles has recognised the valuable assistance of his colleagues in the scientific staff; the aid which all the naval officers, without exception, gave in the most friendly spirit to the civilian staff; the wonderful temper with which the commander and first lieutenant tolerated all the irregularities inseparable from dredging and other scientific work; the friendly readiness with which the chief of the naval scientific staff placed his valuable observations at the disposal of the civilian staff; the patience and care displayed by the lieutenants who superintended the dredging and trawling and the estimations of temperature; and his debt of gratitude to the sailors for the respect and consideration with which they treated all the civilians on board.

These were, no doubt, remarkable results—this combination of everyone on board to achieve success, this subordination of the discipline, cleanliness, and order of a man-of-war to the prosecution of the study of Natural Science in various departments; and it cannot be doubted that they were mainly due to the genial disposition, the many engaging social qualities, the gentlemanly bearing, and the untiring energy of Sir Charles Wyville Thomson.

He admitted that the strain, both mental and physical, was long and severe, and that it had told upon all of them. His friends observed that, with the continuance of the labours necessary for bringing out the full account of the whole results of the "Challenger" Expedition, his vigour by no means kept pace, but until 1879 there was no real cause for anxiety. In June of that year, however, he had a serious illness, from which he only partially recovered. His place in the University of Edinburgh had to be supplied, and at length arrangements were made for securing to him a well-deserved retiring allowance. From time to time he persevered in endeavouring to forward the publication of the complete reports of the Expedition, and still attended meetings of the Commissioners of Supply for his native county. He even sat as magistrate sixteen days before his fatal illness. But from his first seizure he was unable to discharge the duties of his chair, and retired from them altogether in the October of 1881. Subsequently he had also to relinquish his position as "Director of the 'Challenger' Expedition Commission." In the beginning of March 1882 his critical condition was manifested by his making a personal application to be relieved from attending at the Fiars' Court on the 10th of that month, the very day on which his last seizure proved fatal. He died at the early age of fifty-two, having made many lasting contributions to science, secured large numbers of sincere admirers and friends, and received the applause and approval of scientific men everywhere for the wisdom, energy, skill, and courtesy which he had shown in the direction of the most extended and successful of scientific expeditions.

Lady Wyville Thomson survives her husband. He left an only child—Mr Frank Thomson, M.A. Ed., a student of medicine.

The Commissioners of Supply of the county of Linlithgow, with a committee of scientific and other friends in Edinburgh, have collected several hundred pounds for the purpose of erecting a lasting memorial to commemorate the distinguished services of the late Sir Charles Wyville Thomson, and it has been resolved to place a bust by Hutchison in the University of Edinburgh, and a memorial window in the beautiful collegiate church in his native place.

The following is a list of Sir C. Wyville Thomson's principal publications:—

On the Application of Photography to the Compound Microscope. *Brit. Assoc. Rep.*, part 2, 1850.

Notes on some Scotch Zoophytes and Polyzoa. *Annals Nat. Hist.*, ix., 1852.

On the Character of the Sertularian Zoophytes. *Brit. Assoc. Rep.*, part 2, 1852.

Notes on some British Zoophytes. *Annals Nat. Hist.*, xi., 1853.

On Native Irish Zoophytes and their Allies. *Nat. Hist. Rev.*, ii., 1855.

On the Embryogeny of *Comatula rosacea, Lutk. Roy. Soc. Proc.*, ix., 1857–59.

On some Species of Acidaspis from Silurian Beds of South of Scotland. *Geol. Jour.*, 1857.

Description of *Loricula macadami*, a new fossil Cirripede. *Ann. and Mag.*, 1858.

On New Genera and Species of Polyzoa from the collection of Professor Harvey, Dublin. *Nat. Hist. Rev.*, July 1858.

On a New Palæozoic Group of the Echinodermata. *Edin. New Phil. Jour.*, xiii., 1861.

On the Embryology of *Asteracanthion violaceus*, Lin. *Mic. Soc. Jour.*, i., 1861-62.

On the Development of *Synapta inhærens*. *Mic. Soc. Jour.*, ii., 1862.

On Distorted Human Skulls. *Nat. Hist. Rev.*, 1862.

On the Embryology of Echinodermata. *Nat. Hist. Rev.*, 1863, 1864.

On the Embryogeny of *Antedon rosaceus*, Linch (*Comatula rosaceus* of Lamarck). *Phil. Trans.*, 1865.

On Professor Steenstrup's "Views on the Obliquity of Flounders." *Ann. Mag. Nat. Hist.*, 1865.

Sea Lilies (Cenocrinus—Neocrinus—Comatula). *Intellect. Obs.*, vi., 1865.

On the Glass Rope (Hyalonema). *Intellect. Obs.*, xi., 1867.

On the Vitreous Sponges. *Ann. Mag. Nat. Hist.*, 1868.

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On the Depths of the Sea. *Roy. Dublin Soc. Jour.*, v., 1870.

Osteology of Polypterus. *Jour. Anat.*, 1870.

On Deep-Sea Climates. *Nature*, ii. 1870.

Preliminary Report in connection with Drs W. B. Carpenter and J. G. Jeffries of the Scientific Exploration of the Deep Sea in H.M.S. "Porcupine." *Roy. Soc. Proc.*, xviii., 1870.

On the Distribution of Temperature in the North Atlantic. *Nature*, iv., 1871.

On the Continuity of the Chalk. *Nature*, iii., 1871.

On the Structure of the Palæozoic Crinoids. *Edin. Roy. Soc. Proc.*, vii., 1871.

Notice of a New Family (Echinothuridæ) of the Echinodermata. *Edin. Roy. Soc. Proc.*, vii., 1872.

Deep Sea Echinidea. *Ann. Mag. Nat. Hist.*, 1872.

On the Crinoids of the "Porcupine" Deep-Sea Dredging Expedition. *Edin. Roy. Soc. Proc.*, vii., 1872.

Opening Address on the Ripening and Decay of Fruit. *Edin. Bot. Soc. Trans.*, 1873.

On the Echinoidea of the "Porcupine" Deep-Sea Dredging Expeditions. *Phil. Trans.* 1874; *Proc. Roy. Soc.*, 1872.

The Depths of the Sea. (1 vol.), 1873.

On Dredgings and Deep-Sea Soundings in the South Atlantic, in a letter to Admiral Richards, C.B., F.R.S. *Roy. Soc. Proc.*, 1874.

Preliminary Notes on the Nature of the Sea-bottom, procured by the Soundings of H.M.S. "Challenger" during her Cruise in the Southern Sea in 1874. *Roy. Soc. Proc.*, 1874.

Report to the Admiralty on the Cruise of H.M.S. "Challenger" from July to November 1874. *Roy. Soc. Proc.*, 1875.

Notice of New Living Crinoids belonging to the Apiocrinidæ. *Linn. Soc. Jour.*, "Zoology," vol. xiii.

Report to the Admiralty on the Cruise of H.M.S. "Challenger" from June to August 1875. *Roy. Soc. Proc.*, 1875.

Some Peculiarities in the Mode of Propagation of certain Echinoderms of the Southern Sea. *Linn. Soc. Jour.*, "Zoology," vol. xiii., 1878.

Preliminary Report to Admiralty on the Cruise of the "Challenger" between Hawaii and Valparaiso. *Proc. Roy. Soc.*, 1876.

Preliminary Report to Admiralty on the Cruise of the "Challenger" from Falkland Island to Monte Video. *Proc. Roy. Soc.*, 1876.

On the Structure and Relations of the Genus Holopus. *Edin. Roy. Soc. Proc.*, 1877.

Voyage of the "Challenger. The Atlantic. (2 vols.), 1877.

On the Conditions of the Antartic Regions. *Glas. Science Lectures' Assoc.*, 1877.

Presidential Address to the Geographical Section. *Brit. Assoc., Dublin*, 1878.

The General Introduction to the Zoological Series of the Reports of the Voyage of the "Challenger." Vol. i., "Zool.," 1880.

Note.—Sir Charles Wyville Thomson had also undertaken to write the "Report on the Crinoidea" of the voyage of the "Challenger" in conjunction with Dr P. H. Carpenter.

MR THOMAS WILLIAM RUMBLE. By William Connor Steel Rumble.

MR THOMAS WILLIAM RUMBLE was born in London, 26th December 1832. He received part of his education at the Reading Grammar School, under the celebrated Dr Valpy. At an early age he was transferred to the office of his father, an architect in good practice, where he was taught the rudiments of his future-profession. Tiring of the dull routine of the drawing-office, he left home to try his fortune across the Atlantic, where, after many adventures, he was appointed in November 1850 assistant engineer on the Central Railroad of New Jersey, under J. Laurie, Esq., C.E., he being then not quite 18 years of age. He remained in America till June 1852, during which time he was actively engaged in laying out the Erie and Forest Lawn Cemeteries, superintending the building of the Berks County Baths, the Buffalo Public Wash-houses, &c., and occasionally giving lectures on architectural and engineering subjects. Dr Calvin Fairbanks, in a letter dated 1st October 1851, speaks thus of his ability as a lecturer:—"I must say I was gratified with the clearness with which you presented the necessity of developing the yet undeveloped facts in architecture, in your last evening's lecture. It would have been happy had there been a more general interest at an earlier period. I hope, Sir, it may be convenient for you to favour us again with a repetition of the same, followed by illustrations and remarks."

Almost immediately on his return to England, Mr Rumble obtained work in Kensington, superintending the building of All Saints' Church and the laying out of the Kensington Park Estate.

In October 1853 he went out to Bombay, as assistant engineer on the Bombay, Baroda, and Central India Railway, then in course of construction. An attack of fever obliged him to return on sick